

Dedicated to
the pious memory
of
My dear Father,
PRASANNA KUMAR BOSE,
whose character and noble life
inspired the author to serve
suffering humanity.

PHARMACOPOEIA INDICA

BEING
A COLLECTION OF VEGETABLE,
MINERAL & ANIMAL DRUGS
IN COMMON USE
IN INDIA

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With a foreward by
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FOREWORD

I have been asked to write a foreward by way of introducing this valuable work. I do this with great pleasure for three reasons. Firstly, because the work is written on highly practical lines as it deals only with such indigenous drugs belonging to the vegetable, mineral and animal kingdom as are in constant use in Ayurvedic practice. Secondly, because the descriptions are re-inforced with the results of careful pharmacological researches in many cases. And thirdly, because the author is a learned veteran of vast experience directly obtained by the extensive use of indigenous drugs in his practice.

However great may be the value of Pharmacological experiments the results obtained by them vary widely according to the methods and subjects employed. Various sources of error have also to be eliminated by experienced workers. Findings *in vivo* specially in morbid conditions very often differ considerably from results obtained *in vitro* under artificially induced conditions which are seldom normal. The final acid test therefore should be that of clinical experience. Even here the success or failure to obtain the expected results depends on many conditions. Improperly used, even the most valuable drugs may prove ineffective. Modern clinical researches have shown this very clearly. e.g., in the case of Ipecacuanha, Digitalis and various other drugs. In this field of clinical experience the author has had singular advantages. With his own laboratories to work out his ideas and test his clinical results he has believed nothing until it was proved, beyond cavil in both fields.

No very brilliant results can be achieved nowadays without teamwork. In this respect too the author has been very fortunate as his work has always been scrutinised by a team of research workers of considerable merit and experience.

Working with the author in his laboratories in the course of our investigation of certain drugs like Aconite, Rauwolfia Serpentina etc, I have found out that though himself a great clinician and respector of the classical writers, the author has uniformly kept his mind open during the laboratory experiments, as he has often been a sceptic. This sceptic attitude of mind is a gift of the scientific mind and it has been the means of putting the

diligence of his learned assistants to severe tests as may be seen in the graphs and findings embodied in the Appendix of the book.

Another feature of the work which appeals to me greatly is the regard shown by the author to the findings of older workers in the line. He is not too self-centred as some workers are and has judiciously quoted from the findings of the western and eastern scholars of the past. It is a well-known fact that science has solved the apparently mysterious effects of certain popular drugs like Cinchona bark and Foxglove, yet many such mysteries are still unsolved. An utter neglect of popular views therefore would be as bad as their blind acceptance.

Whilst I heartily appreciate the good work done by the author, I am not blind to his shortcomings and I am sure he knows them better than I do. With the progress of science and clinical experience several and severe corrections may be needed in this work. A great and valuable work has been started but much has to be achieved yet. Co-operation of workers here and abroad is wanted to complete the work begun by the author.

I am confident that such co-operation would be soon forthcoming as the author has succeeded in throwing a flood of light into the dim vistas of indigenous medicine. As the title implies, this work is the nucleus of a greater Pharmacopoeia Indica to be built on by the author and his successors later on.

As to the compound formulae quoted under many drugs, I may add confidently that I have found most of them very effective therapeutic agents and many of them can be employed by my brother practitioners to relieve suffering humanity. Perhaps the scientific mania of finding the so-called active principles—often active in different ways—has helped to retard rather than advance our progress in the field of therapeutics and it is high time we looked back into our old treasures. Not that the finding of active principles is of no use but the natural combinations of these found in the whole drugs are not to be overlooked and their use should not be considered unscientific. This is the keynote of Dr. Bose's researches and will, I hope, appeal strongly to all practical clinicians.

CALCUTTA
7th February, 1932.

} GANANATH SEN

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Opinion of Dr. Bidhan Chandra Roy, M.D., M.R.C.P.,
F.R.C.S. (Eng.), Mayor of Calcutta
on the receipt of the Advance Copy of Pharmacopoea Indica

36 Wellington Street,
Calcutta.

15th February, 1932

The unremitting toil of Dr. Kartick Chandra Bose for over a quarter of a century in the investigation of vegetable, mineral and animal drugs in common use in India and in Bengal, and in making a collection of the results of such investigation for the use of medical practitioners, is manifested in the pages of the book he is about to publish. It proves to all concerned the truth of the saying that a disease, if found in the tropics, should be and must be cured by drugs which are available in the tropics. In his book "Pharmacopoea Indica" he had made an effort to demonstrate the physiological and clinical results of such drugs and to explain these results, as far as is possible, by experimental methods.

In spite of all that we, the medical practitioners in India individually, may feel regarding the use of the so-called "Ayurvedic" medicines in the treatment of diseases, there is always in the mind of every enquiring person a feeling that there is a substratum of truth in the claims made by protagonists of indigenous drugs. The obvious conclusion is that if the use of such drugs to-day do not bring about the results that are expected from them, it is because we have lost the art of using the drugs at the proper time, in a proper form, and in the requisite quantities. We can not, however, ignore the fact that the system had grown in India, not because of any extraneous circumstances, but because this system was found to be the best adapted to the needs of the people of this country. Dr. Bose has tried to

indicate how this adaptation took place in the past and can again be repeated in future.

There is another aspect of the question to which I must refer in this connection. The poverty of the people of this country is almost an axiomatic truth. The present economic distress has naturally led Dr. Bose to put before medical practitioners a list of over a hundred vegetable, metallic and other drugs which can be availed of at a very cheap cost for the benefit of the "afflicted" of this country. It is possible that Dr. Bose's findings may not ultimately be found correct in all instances. It is possible that further clinical and experimental investigation might strengthen or disprove the findings of Dr. Bose. But that this attempt would remain as one of the land-marks in the development of the scheme for the use of indigenous drugs for the people of this country, I have no doubt whatsoever. I hope all the other practitioners will follow suit and give to this attempt of Dr. Bose an earnest and honest consideration. }

INTRODUCTION

TO THE

VEGETABLE DRUGS OF THE PHARMACOPOEA INDICA.

The Indian and Colonial Addendum to the British Pharmacopoeia 1898, came out in 1900 and forty Indian Indigenous Drugs were made official.

A small book styled "The Official Indigenous Drugs of India" was written by me and published in 1902. Since then, for more than quarter of a century, while engaged in the administration of many indigenous drugs in the treatment of my patients, I have had ample opportunities of observing the action and ascertaining the proper mode of use of the important Indian vegetable drugs; I had also ample scope of doing chemical analysis and physiological experiments for ascertaining their action in my own laboratory. In this section of the vegetable drugs, I intend to narrate all my experiences as well as the informations collected by me from various sources as to the proper and efficacious use and mode of administration of these drugs.

I now appeal to the medical profession and research scholars to examine my observations in a scientific and critical manner and finally request them to communicate to me their findings.

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at the Standard Drug Press
45, Amherst Street, Calcutta.

**In this book description of the drugs has been given
under the following items :**

(1) *Habitat*—i. e., the place where the drug can be obtained in Nature. The drugs described in this book are mostly indigenous to India but a few have been included from the British Pharmacopea—such as Cinchona Bark, Digitalis, Hyoscyamus, Ipecac, Eucalyptus etc.,—Now all these grow in India—so that these can now aptly be called Indian Drugs.

(2) *Collection of Drugs*—On this depend to a great extent, the potency of Drugs that are obtained from the vegetable kingdom. There are certain seasons, at which certain plants attain maturity. If, then, plants are collected earlier than the proper time, they do not exert the full medicinal effects and we shall try to embody this information as far as possible in the body of this volume.

(3) *Storage of Drugs*.—This forms an important item, for with proper storage, the properties of the drug will remain unimpaired ; and the duration of the storage, has also got considerable effect on its keeping quality ; for by keeping in store, for a long time in our humid hot climate, the drugs become deteriorated and sometimes quite inert.

(4) *Use of the drug*—is the most important item ; how to use it,—either whole drug. or decoction or extract or tincture or any other form—on this depends the real therapeutic effect.

(5) *Physiological action & therapeutic use of the drugs*.—We shall take advantage of and discuss these from the published literature and add the results of our own observations. We shall also explain the western physiological action in terms of the Ayurvedic Tridosha Theory of Vayu (cell force), Pitta (the metabolic principle) and Kapha (the cooling or preservative principle) as found in Ayurvedic literature.

N. B.—The physiological and analytical findings will be found described in some detail in the Appendix.

WEIGHTS & MEASURES.

(A) INDIAN (AYURVEDIC)

Rati or *Gunja*, the seed of *Abrus Precatorius*, is the standard minimum weight. The weight of one *Gunja* or *Rati* is taken as $1\frac{7}{8}$ grains.

The *Unit* of weight in this country is the *Tola*, which is equivalent to 180 grains of the British Pharmacopoeia—being the weight of a rupee of the present currency.

Half a tola=90 grains=the weight of a silver half-rupee of the present currency.

One *Sikhi*=A quarter tola=45 grains=the weight of a silver quarter-rupee of the present currency.

1 Dhan=is one grain of Paddy.

4 Dhans=One Rati.

6 Raties=One anna.

8 Ratis=One Masha or 15 grains.*

16 Annas=One Tola=12 mashas or 180 grains.

5 Tolas=One Chittack.=2 ounces.

16 Chittacks=One seer=32 ounces

(B) BRITISH (IMPERIAL)

Measures of Weight :

1 grain=grain (gr. i)

20 grains=1 scruple.

60 grains=1 dram.

437.5 grains=one ounce (oz i)

16 ounces=one pound (1 lb.)

The dram or drachm=60 grains as commonly used, but it is not official. This is a great anomaly.

* In Bengal, one masha is the equivalent of 12 Ratis and 8 mashas make one tola.

Measures of Capacity.

One minim = m.i

60 minims = One fluid drachm.

8 Fluid drachms = One fluid ounce.

20 Fluid ounces = One pint (O i)

8 Pints = One gallon (C.)

Domestic Measures.

One Tea-spoonful is about one fluid drachm.

One Dessert-spoonful is about two fluid drachms.

One Table-spoonful is about half a fluid ounce.

One Wine-Glassful is about one and half to two fluid ounces

One Tea-cupful is about five fluid ounces.

One Tumblerful is about ten fluid ounces.

A 'Drop' (*gutta*) is generally taken to represent one *minim*, but drops differ very much in size ; therefore they should never be used as a measure of powerful drugs.

(C) METRIC SYSTEM

Measure of Mass (Weights).

Milligram (Mg) = the 1000th part of 1 gramme or 0.001 G.

1 Centigram (Cg) = the 100th part of 1 gramme or 0.01 G.

1 Decigram (Dg) = the 10 part of 1 gramme or 0.1 G.

1 gramme (G m) = $15 \frac{1}{2}$ grains nearly or the 1000th part of Kilogram (Kg)

1 Kilo-gram = 2 lbs. approximately.

Measure of Capacity (Volumes).

1 Centimil (Cl) = the Vol. at 4° C of 1 centigram of water

1 Decimil (Dl) = " " 1 decigram of water.

1 Millilitre.

or Mil (Ml) = " " 1 gramme of water.

1 Litre (Lit) = " " 1 Kilogram of water
or 1000 c.c. or
nearly $1 \frac{1}{2}$ pints.

ABIES WEBBIANA

= तालिशपत्र =

(N. O.—CONIFERÆ)

Vern. Sans.—Talisapatram. **Eng.**—Himalayan Silver Fir. **Hind and Beng.**—Talispatra. **Tel., Tam. and Can.**—Talispatri. **Mal.**—Taleesapatram, **Bom.**—Barami.

Habitat.—This lofty fir is widely distributed on the higher ranges of the Himalayas.

Parts Used.—Leaves and slender stems.

Collection and Storage—It is usually collected in the autumn when the trees of the Himalayas are in full vigour. The drug deteriorates by keeping in the moist hot climate of Bengal (vide Appendix). Slender stems and leaves have a greenish colour and the older specimen, brown.

Chemical Composition.—Contains a glucoside. Analysis in my laboratory failed to detect any alkaloid. (See Appendix).

Physiological Action.—Carminative, Expectorant, Stomachic, Tonic, Astringent and Antispasmodic. It increases appetite, aids digestion, stops vomiting and diarrhoea, allays cough and dyspepsia and corrects flatulence. In large doses, it is poisonous.

Dose—5 to 10 grains.

Therapeutics.—The dried leaves are used in phthisis, asthma, bronchitis, and catarrh of the bladder. Powder of the leaves in doses of half to one dram is given with the juice of *Adhatoda Vasica* and honey in cough, asthma and hæmoptysis. Dr. F. Hamilton says “the Hindu Doctors of Behar use an infusion of talispatra in the treatment of hoarseness.” The leaves have been recommended in epilepsy and other spasmodic affections.

A confection called *Talisadya Churna* (prepared with *Talispatra* 1, black pepper 2, ginger 3, long-pepper 4, bamboo-manna 5, cardamoms $\frac{1}{2}$, cinnamon $\frac{1}{2}$ and sugar 40 parts) is used in sore-throat, cough, asthma and hæmoptysis. **Dose of *Talisadya Churna*** is—20 to 40 grains with water.

N. B.—This *Talisadya Churna* deteriorates on keeping, so it is necessary that all the ingredients be freshly powdered and mixed together before use. In order to avoid this trouble, tablets of this preparation can be used as they keep good for about one year, whereas the powder keeps good for only a couple of months.

ABROMA AUGUSTA

=उलटकम्बल=

(N. O.—STERCULEACEAE)

Vern. *Eng.*—Devil's Cotton. *Sans.*—Uchchata (?) *Beng.*—Ulutkambal. Olatkambol.

Habitat.—Bengal. Throughout the hotter parts of India from U. P. to Khashia Mts., and Assam.

Part Used.—The root-bark.

Collection and Storage—Can be collected during all seasons; the dried root-bark is to be kept in pieces in air-tight bottle.

Chemical Composition.—The root-bark contains gum, wax, non-crystalline extractive matter and ash; there is no glucoside or alkaloid.

Physiological Action.—The root-bark is emmenagogue and uterine tonic. The action of the dried root as well as the sap of the fresh root, has been studied in my laboratory. It showed marked uterine contractions (vide Appendix). The active principle of the drug is totally destroyed if mixed with alcohol or any other preservative. The writer sent a few pounds of the Ext. Abroma Augusta Liq. to E. Merck of Germany, about 20 years ago, to ascertain its physiological action and the sample was declared as quite inert; so it is useless to use the drug in the form of Ext. Abroma Augusta Liq. as is usually sold in the market; either the fresh root-bark or dried root-bark should be used.

Dose—(a) Fresh root 1 to 2 drams, (b) Fresh Sap 30 minims to one dram, (c) Dried root-bark 20 to 30 grains.

Therapeutics—The root sap rubbed up with powdered black pepper is given in congestive and neuralgic dysmenorrhoea and amenorrhoea; it is given either a week before or during menstruation. It is a valuable substitute for hydrastis, viburnum and pulsatilla. Dr. J. H. Thornton says :—"The slender roots are useful in the congestive and neuralgic varieties of dysmenorrhoea and act as uterine tonic. It regulates the menstrual flow. It should be given during menstruation in 1½ drachms of the fresh root for a dose with black pepper, the

latter acting as a stomachic and carminative. In 1872, Dr. Bhubun Mohan Sircar (Ind. Med. Gaz.) first called attention to the use of the root as an emmenagogue in Bengal and recommended the fresh viscid sap in the treatment of dysmenorrhoea in doses of 30 grains. A single administration during the menses generally cures the disease and brings on conception in young married women.

ABRUS PRECATORIUS.

= गुआ =

(N. O.—LEGUMINOSÆ)

Vern. Eng.—Jequirity, Indian liquorice. **Sans.**—Gunja. **Hind.**—Rati. **Ben.**—Kunch. **Pers.**—Gunchi, chashami Khurosa. **Guz.**—Gumchi. **Mah.**—Gunja. **Tam.**—Gundumani. **Can.**—Gurugunji. **Mal.**—Kunni. **Punj.**—Mulati. **Cash.**—Shangir,

Habitat.—All India, from the Himalayas down to Ceylon

Parts Used.—Roots, Seeds and Leaves. The seeds are used as standard weight in India (about $1\frac{1}{8}$ grains.)

Collection and Storage.—When the seeds are ripe.

Chemical Composition.—The seeds contain an albuminous substance of a poisonous nature, named abrin, the active principle, similar in action to snake-venom and also arabic acid, Like all albuminous seeds it loses its activity when boiled. Its roots contain about 15 p. c. glycerrhizin and 8 p. c. of an acrid resin; leaves also contain about 10 p. c. of glycerrhizin.

Physiological Action.—The poisonous and irritant properties of *Abrus precatorius* are due to the contained *Abrin* which has been termed a “vegetable agglutinin” and is a powerful cardiac depressant. Its poisonous properties are abolished when it is coagulated by heat viz., at about 85° C. When applied to the conjunctiva it causes a violent inflammation of this membrane. This poisonous property has been utilized by the low class people (chamars) to poison cattle by means of cone shaped preparation of it known as Sui or Sutari, which is thrust under the skin of the

animal to be killed ; the animal generally dies within 48 hours. It has got a depressant action on the nerve-endings, producing nerve-block (vide Appendix).

The symptoms resulting from internal use or hypodermic injection of abrin are faintness, vertigo and vomiting ; cold, clammy skin ; dyspnoea, a small, frequent, irregular pulse ; convulsions, and collapse. Death is said to occur from cardiac paralysis ; according to Kobert, from clumping of the red corpuscles.

The seeds are poisonous when a paste of them is applied to open wounds. Applied to the eyes, they set up inflammation, oedema of the lids and ulceration of the cornea. The face and neck become swollen and the maxillary glands enlarged.

Ehrlich showed that animals could, upon repeated administration of abrin, be rendered immune to it ; a specific antitoxin being generated. Remer showed that repeated instillations in a rabbit's eye will similarly produce a marked local immunity, which is soon followed by general immunity.

Calmette and Delé'arde prepared an antiabrinic serum, whose injection prevents the poisonous action of abrin, and hastens the disappearance of the virulent ophthalmia induced by abrin.

These immunity phenomena have been found to apply to man as well.

Internally used, the boiled seeds are demulcent, expectorant. The seeds are used as a purgative, but in large doses act as an acrid poison, giving rise to symptoms resembling those of cholera. The poisonous property is generally believed to lie in the red covering of the seed. When boiled with milk, the seed is said to have a very powerful tonic action on the nervous system. The boiled seeds are said to possess powerful aphrodisiac properties. By Ayurvedic writers, the root is described as emetic.

Dose of powder of boiled seeds.—1 to 3 grains,

Therapeutics.—The fresh leaves are chewed with cubebs and sugar to relieve hoarseness of voice as in sore-throat and aphthae of the mouth. With Chitraka-mula, the paste of the leaves is applied in such skin diseases as leucoderma and the same is also recommended as a cure for baldness over the scalp. If the leaves

are steeped in warm mustard oil and applied over the seat of pain in rheumatism, much benefit will be derived.

The seeds reduced to a paste are recommended to be applied locally in sciatica, stiffness of shoulder-joint, paralysis and other nervous diseases. In white leprosy, a paste composed of the seed and plumbago-root is applied as a stimulant dressing. The watery extract of the root is useful in relieving obstinate coughs.

Caution in handling the seeds—While pounding jequirity seeds one is liable to an attack of conjunctivitis, rhinitis, or bronchitis, and any cuts or scratches on the fingers become swollen, painful and the centre of an erythematous blush. Careless handling of abrin is extremely dangerous to the eye and the nose.

Jequirity Therapy :—The use of the unboiled seeds, is only limited to obstinate cases of trachoma and pannus of the eye, which have resisted all other modes of treatment. The essence of its action, consists in the replacement of an existing chronic inflammation by another of more violent type, but of limited duration. Although the drug is said to have been used in Brazil for centuries, as a popular remedy for granular cyclitis and pannus, it was de Wecker of Paris, who in 1882, revived interest in this remedy.

The Infusion of jequirity is prepared as follows :—

Distilled water is boiled and then cooled to 120°F (49°C). 12½ fluid ounces (50c.c.) of this is measured out, 1 dram (4 grams) of powdered jequirity is taken and the distilled water at this temperature is poured on the powdered seeds. This is allowed to stand, until cool and the infusion then decanted. The slightly opalescent fluid obtained, is employed for instillations.

An improved preparation, of jequirity, *jequiritol*, introduced by Roemer, the German ophthalmologist, is a sterile liquid containing 50% of glycerin and abrin in four different but definite strengths, the preparations being numbered 1. to 4. A single drop of No 1 is first instilled, then an increasing number is gradually dropped, until the characteristic reaction is seen.

In using jequiritol, Roemer applies cocaine first, avoiding bichloride of mercury washes and begins with No 1 preparation increasing the dose daily and then using No 2 vial, increasing the dose of that also. When there is a reaction, he waits until this subsides and resumes with the dose that caused the inflammation, discontinuing applications usually after the second reaction. Mild trachoma is favourably modified by weak solutions, even when no reaction is reached and jequiritol has been of undoubted advantage in persistent *phlyctenular disease*, *chronic conjunctivitis*, pseudo-ptyergium and after *conjunctival burns*. De Wecker states, however, that equal doses of jequiritol do not produce the same result in all eyes.

Good service is rendered in the *Chronic pannus* of *cicatricial trachoma* and in *eczematous pannus* and *keratitis*. Old scars on the *cornea* will frequently yield.

Contraindications for Jequirity treatment—In the presence of purulent conjunctivitis, or keratitis, of fresh trachomatous pannus, of recent opacities, and of diseases of the lachrymal apparatus, the use of jequirity or jequiritol is contraindicated.

ACACIA ARABICA.

= वबूलः =

(N. O.—LEGUMINOSAE)

Sans.—Vabboola. Barbara. **Eng.**—Indian gum-arabic tree. **Hind.** and **Mah.**—Babul ; Kala-babli. **Beng.**—Babla. **Guz.**—Kaloabaval. **Tel.**—Nallatumma. **Tam.**—Karuvael. **Mal**—Karuvelum, **Punj.** and **Cash.**—Sak. **Pers.** and **Arab.**—(extract) Akakia.

Habitat—Grows wild on road sides and near ponds.

Parts Used—Bark and gum.

Collection and Storage.—The dried bark of *Acacia Arabica* is obtained from wild or cultivated trees, not less than seven years old, and then dried, kept for one year before use. The gum is collected from mature trees during the summer season.

Chemical Composition—The bark contains tannin. The gum contains arabic acid combined with calcium, magnesium and potassium, also small quantity of malic acid, sugar, moisture 14 p. c., ash 3.4 p. c.

Physiological Action—*The Bark* is astringent, internally as well as externally ; it is an equivalent of the official oak bark. *The gum* is soothing and demulcent.

Dose of the powdered bark $\frac{1}{2}$ to 1 dram, of the gum 30 grains to 2 drams.

Therapeutics. Externally—The decoction of the bark is useful in Chronic Dysentery and Diarrhoea as an astringent enema. In Chronic Dysentery with relaxed state of the rectum and a little mucus in stools, the injection reduces the quantity of mucus, soothes the irritability and gives tone to the mucous membrane.

It is a useful gargle in spongy bleeding gums, mercurial salivation, and in relaxed sore-throat as well as in acute congestion of the throat. It is also a useful wash in hæmorrhagic ulcers.

It is used as a local astringent injection in Leucorrhoea and forms an excellent substitute for oak bark for this purpose.

Dr. Joubert notes—"I have frequently used the decoction of Babul Bark as a substitute for oak-bark for vaginal injection. It might take the place of imported oak-bark."

Dr. Doyal Chandra Shome notes—"I have frequently used the decoction of the bark, as an astringent injection, in different forms of leucorrhoea and found it to be more efficacious and less irritating than the alum and zinc injection generally used."

The decoction is also useful as injection in cases of Prolapsus ani and Prolapsus uteri and in other uterine and vaginal affections of an asthenic nature.

The powdered dry bark, dusted over sores and ulcers on the lips of horses, is one of the best cures for these troublesome affections.

Therapeutics. Internally—The decoction (1 in 8) may be used as an astringent tonic in 2 to 4 ounce doses.

The gum is used as a food for diabetic patients, as it is not convertible into sugar. It is demulcent, emollient and nutritive and used for irritated conditions of mucous membranes as in cough, sorethroat, gastro-intestinal catarrh (as diarrhoea, dysentery) and

in genito-urinary catarrh (leucorrhoea, cystitis, urethritis etc.) and also in cases of irritant poisoning.

In pharmacy, it is used to suspend heavy insoluble powders in mixtures and in making pills, lozenges and tablets.

ACACIA CATECHU.

=खदिर=

(N.O.—LEGUMINOSAE.)

Vern. Sans.—Khadira. **Eng.**—Black Catechu. **Hind.**—Khair. **Beng.**—Khayer. **Uriya.**—Khoiru. **Tel.**—Kanchu. **Mar.**—Khair.

Habitat—Acacia catechu and similar trees of this species are widely distributed.

Parts used.—Wood and an extract prepared from the wood of Acacia Catechu, are known as “cutch.” It is without odour, and has a sweetish, astringent taste. Several varieties are found in the market.

Chemical Composition.—Contains catechu-tannic acid, catechin, catechu red, querecetin and gum. May be employed in making the B. P. preparations for which catechu is directed to be used.

Physiological Action.—Catechu is a powerful astringent, the dark coloured variety is somewhat more powerful than the light (i. e. the pale) variety. It is believed to be anaphrodisiac and to cause impotence when used in excess.

Dose—of, Wood Bark, 10 to 40 grains ; of the Extract 5 to 10 grains. Decoction, (1 in 10) 2 to 4 ozs.

Therapeutics. Externally.—1. The powder applied to spongy-gums proves useful and it has been recommended as a dentifrice in combination with powdered charcoal, Peruvian bark, myrrh, arecanut burnt to charcoal and almond shell etc.

2. Sprinkled upon the surface of indolent ulcers, it is occasionally beneficial and it is much used in this country for the same purpose in the form of an ointment,

An ointment made with lard and fine powder of catechu is useful in chronic ulceration attended with much foetid discharge ;

in obstinate cases, addition of sulphate of copper enhances its action. In prolapsus ani and protruding piles, catechu with lard and opium has been found of great service ; bathing or fomenting with an infusion of catechu, is also beneficial.

As a styptic in hæmorrhage, the powdered extract has been found useful if sprinkled over the wound. It is also beneficial as a local application to primary syphilitic sores.

It is an useful application to sore nipples and as a preventive against the ill effects of nursing.

The powder is useful in otorrhoea ; it is also made into an ointment with ghee and applied to cancers.

An infusion of catechu may be used as an injection in obstinate gonorrhoea and it has been found highly beneficial in arresting epistaxis, when thrown up the nostrils.

Internally—1. Small piece held in the mouth and allowed slowly to dissolve is an excellent remedy in relaxation of the uvula and the irritation of the fauces and troublesome cough which depends upon it.

2. It is very useful in diarrhoea or dysentery depending on debility or relaxation of the intestinal mucous membrane but contra-indicated in inflammatory condition of the bowels or when there is disorder of the functions of the liver.

3. It is supposed to have an action on the womb when prescribed with myrrh analogous to that possessed by ergot. A mixture of catechu and myrrh called Kathbol is very generally given to women after confinement as a tonic and to promote the secretion of milk.

4. 1 to 4 grain dose is used as an expectorant. It is used in bronchial affection with sugarcandy and turmeric.

5. It is taken in doses of from 10 to 20 grains by Hindu widows with a view of suppressing sexual desire.

स्वल्पखदिर वटिका—(Svalpa-Khadira Vatika)—is an Ayurvedic preparation and favourite medicine in diseases of the mouth and gums. It is prepared with catechu 12, boiled with 5 times water to 8 parts and fine powders of nutmeg, camphor, betelnuts and kakkola, each $\frac{1}{2}$ part and mixed and made into pillular

form. Tiny pieces are to be kept in mouth and slowly sucked in affections of the teeth, gums, palate and tongue.

6. In Leprosy—The decoction can be freely used as a drink, wash and application.

7. As an antidote for vegetable and mineral poisoning, the decoction of the root bark, or the extract can be used.

ACALYPHA INDICA.

=मुक्तवर्षी=

(N. O. EUPHORBIACEAE)

Sans.—Arittamanjari. **Eng.**—Indian acalypha. **Hind.**—Kupi. **Beng.**—Muktajhuri **Mar.**—Khokli, khajoti. **Guz.**—Vanchhi Kanto. **Uriya.**—Indra-maris. **Tam.**—Kuppaimeni. **Tel.**—Kuppai-chettu. Murkanda-chettu. **Kanara.**—Chalmari, kuppi,

Habitat—Plant is a common annual in Indian gardens.

Parts Used.—The fresh and dried herb, leaves and roots.

Chemical Composition—Contains an alkaloid Acalyphine,

Physiological Action.—In small doses, it is expectorant and nauseant ; in large doses, it is emetic. The expressed juice of the leaves is in great repute, wherever the plant grows, as a safe, certain, and speedy emetic for children. Like Ipecac., it seems to have little tendency to act on the bowels or depress the vital powers and it decidedly increases the action of the pulmonary organs. The expressed juice of the root and leaves has got a slightly laxative action on children. It is also anthelmintic. It is the therapeutic equivalent of Senega Root.

Dose—Powderd plant—10 to 30 grains ; fresh juice of the leaves 30 to 60 minims ; Infusion (1 in 9) $\frac{1}{2}$ to 1 oz. Decoction—(1 in 20)—1 to 2 ozs.

Therapeutics.—It is a very good expectorant, useful in Bronchitis of children. In Asthma and Bronchitis, this drug is useful for adults as well as for children. A tincture made from

Spiritus Aetheris with the fresh herb is specially useful in asthmatic troubles (3 oz. in one pint of Spiritus Aetheris). Dose 20 to 60 minims, frequently repeated during the day with honey ; it acts as an expectorant ; in large doses, it is an emetic.

Other Uses of the Plant.—The fresh juice of the leaves, mixed with lime, is applied locally to painful rheumatic affections. It is useful in Scabies, Ringworm, and to maggot-eaten sores.

A Cataplasm of the leaves is a useful local application to Syphilitic sores and also a means of relieving the pain and irritation attendant on the bites of venomous insects.

The juice of the plant is inserted, with pledgets of cotton wool, into each nostril, in congestive headaches ; this relieves the head symptoms by causing hæmorrhage from the nose.

In early stage of acute mania, the Hakims drop fresh juice (one ounce) with common salt (gr. 6) in both nostrils every morning, followed by cold shower bath, for three mornings successively. This acts as a "Brain-Purge", so called owing probably to a quantity of mucus and other matters escaping from the nostrils, immediately after the application of the above recipe.

Fresh leaves, ground into a paste, and made into a ball, to the size of a large marble and introduced into the rectum, is very useful in relieving the obstinate constipation of children.

The powder of the dry leaves is used in bedsores and wounds attacked by maggots

ACHYRANTHES ASPERA.

=अपामार्ग=

(*N. O. AMARANTACEÆ*)

Vern. *Sans.*—Apamarga. *Eng.*—Rough Chaff tree ; Prickly Chaff-flower. *Ben.*—Apang. *Hind.*—Chir-chira. *Bom and Mah.*—Aghada. *Tel.*—Apa margamu. *Tam.*—Nayurivi. *Gujrat.*—Kutri. *Mal.*—Katalati. *Sind.*—Margia.

Habitat.—A small herb, found all over India.

Parts Used.—The herb, leaves, seeds and root.

Collection and Storage.—It is collected when the plant is full with fruits.

Chemical Composition.—No alkaloid or glucoside can be detected in the plant. The alcoholic extract is about 7 p. c. of the crude drug which separates into two portions, one greenish plastic mass, soluble in ether and chloroform and the other consisting of brown semi-crystalline granules soluble in water, consisting mostly of potassium salts. The ash of the plant contains potassium salts, organic matter and traces of iron and aluminum. (For detailed analysis, see Appendix).

Physiological Action.—The drug is acrid and diuretic on account of the contained salts as well as antiperiodic. The resinous soft extract has got a depressant action on the frog's heart (vide Appendix). Hence it is described as वायुनाशक (inhibitor of cell-force.)

Doses—Juice of fresh leaves 2 to 3 drams ; decoc. of the plant 2 to 4 ozs. ; of the root 40 to 80 grains ; seeds (powdered) 30 to 60 grains.

Therapeutics. Externally.—The herb is rubbed into a paste with water and used as eye-salve (anjan) in opacity of the cornea and is applied with much benefit to bites of venomous insects, stings of wasps and in snake-bite. A medicated oil called Apamarga Taila (sesamum oil 1 seer, alkaline water of the ashes of the plant 4 seers and Apamarga Kshar $\frac{1}{4}$ seer to be boiled together, till the water is completely evaporated) is dropped into the ear in deafness and noises in the ears. The ash mixed with orpiment is used externally in the treatment of ulcers and of warts on the penis and other parts of the body. It is used in cases of abscess. It is said that its fresh root is tied to the hair of parturient women in difficult labour and immediately after delivery removed and thrown into a running stream of water. The whole herb is rubbed over the body with green turmeric in cases of skin eruptions.

Internally.—The decoction is a good diuretic, found efficacious in renal dropsies. It is also very useful in piles. The decoction

is made in the following way :—Take leaves and roots 2 drams, warm water 8 ounces ; keep these in a covered vessel for three hours. Dose.—one ounce taken thrice daily.

An infusion of the root is given as a mild astringent in bowel complaints and is in great repute in the treatment of looseness of bowels of diarrhoea, cholera &c. Fresh leaves ground into a paste with black-pepper are used as anti-periodic especially in quartan fevers.

The root in doses of one dram is given at bed time for night blindness. A pinch of root-powder with a pinch of pepper-powder and honey is a nice remedy for cough. The seeds and leaves are useful in hydrophobia and snake-bites. The dried plant is given to children for colic and also as an astringent in gonorrhoea. The ashes rubbed with honey are used in cases of asthma and cough. The seed rubbed with rice-water is given in bleeding piles. *Payasam* or *Ksheer* made of seeds in milk is a good remedy for diseased brain. *Kshar* is largely used in anasarca, ascites and dropsy. The drug may be useful in all conditions arising from nervousness. Thus it is used as a *talisman* in hysteria.

ACONITUM FEROX & NAPELLUS.

=अमृत; विष=

(*N. O.* RANUNCULACEAE.)

Vern—*Sans.* Visha (Poison) ; Vatsanabha (resembling the navel of children). *Eng.* Indian aconite ; Monkshood. *Hind.* Telyabish. *Beng.* Kat-bish ; Mithabish. *Mar.* Bachnag. *Tam.* Vashanavi. *Tel.* Vasanabhi, nabhi. *Mal.* Vatsanabhi. *Kan.* Vasanabhi. *Guz.* Shingadio-Vachnag.

Habitat.—This poisonous root-bish is derived chiefly from *Acotinum Ferox* and *Aconitum Napellus*, which are indigenous to the temperate and sub-alpine regions of the Himalayas, Nepal, Cashmere and Sikim.

Parts Used :—The dried tuberous root

Collection and Storage.—It is collected during summer to autumn ; several varieties are known, but the above two varieties are generally used in medicine. It should be kept in a dry place, as moisture deteriorates the strength of the drug.

Chemical Composition.—It contains the alkaloids, aconitine, pseudo-aconitine, aconine, aconitic acid etc. These are highly poisonous. By treatment with cow's urine and exposing to the sun, the drug loses a portion of the active poisonous principles. (शोधनक्रिया, अमृतीकरण of Ayurved. Vide Appendix).

Physiological Action. Externally.—When applied to the skin rubbed up with chloroform or some fatty substance without which it is not absorbed, aconite first stimulates, then paralyses the terminations of the sensory nerves, thereby causing tingling, numbness and anaesthesia.

Internally.—Aconite is slightly sweet to the taste (hence called मिठाविष).

Heart.—In minute doses (1 m. of the B. P. Tr.) it slows and steadies the pulse. This is due to its action on the vagal roots. The blood-pressure falls chiefly from paralysis of the heart.

Temperature.—A febrile temperature is lowered by aconite ; this effect is produced partly by its depressant action upon the heart and the respiratory centre, partly by increased diaphoresis.

Nervous system—Aconite first stimulates and then depresses the periphery of the sensory nerves. The pupils first contract, then dilate. **Kidney**.—Aconite acts as a mild diuretic.

Dose— $\frac{1}{4}$ to $\frac{1}{2}$ grain of the mitigated root powder.

Therapeutics.—Externally.—

The tuberous root is rubbed on a stone with water and the paste is applied to painful parts due to injury (caution—if there be any sore, it should not be used.) This application relieves the pain by its paralysing action on the terminations of sensory nerves. It is used in the form of liniment B. P. (1 in 1), in cases of neuralgia, muscular rheumatism and inflammatory joint affections. The addition of chloroform increases its efficacy.

Internally.—It is used chiefly in inflammatory fevers, nasal catarrh, tonsillitis, sore-throat, etc.

In these cases it should be given in small doses (1 or 2 ms. of the tincture) until there is a relief of the symptoms. In leprosy, it is alterative and is a nervine tonic in cases of paralysis. It controls spermatorrhoea and incontinence of urine. It is found to be remarkably beneficial in diabetes, decreasing the quantity of urine and sugar. For internal administration, the Tincture must be used with great caution on account of the virulent character of the drug. It should not be used when heart disease is present. As in small dose, it is a tonic and febrifuge, the Ayurveda contains a good many compound formulae having mitigated aconite, as one of its ingredients ; we give below a few of the most common and important items.

Swalpa-hasturi Bhairab Rasa (स्वल्प-कस्तूरी-भैरव रस)—It is made up of cinnabar, borax, aconite ferox, mace, nut-meg, black-pepper, long-pepper and musk. Take each of them in equal proportion. Rub them with water and make a two grain pill. It is a very favourite prescription in typhoid fever.

Hingulesvara Rasa (हिंगुलेश्वर रस)—It consists of long-pepper, cinnabar and aconite ferox in equal portions. Rub them with water and make a pill of two grains. It is to be used with honey. It is generally prescribed in rheumatic fever.

Ramavana Rasa (रामवाण रस)—Take of mercury, aconite, cloves and sulphur, each one part, black-pepper, two parts, nutmeg, half a part, rub them together with tamarind juice and make into two grain pills. These pills are given with the addition of powdered black-pepper. It is used in dyspepsia with loss of appetite.

Mrityunjaya Rasa (मृत्युञ्जय रस)—Take of purified aconite, sulphur, black-pepper, long-pepper and borax, each one part, cinnabar two parts ; powder and beat them into a mass with water and make into two grain pills. These pills are given with suitable adjuncts in fever supposed to be caused by deranged air, in ordinary remittent fever and in that of typhoid type.

Kapha hetu Rasa (कफहेतु रस)—Take of aconite, borax, long-pepper and conch-shell lime, equal parts ; powder, mix and soak the mixture three times successively in fresh ginger juice. Dose, two grains, to be given with ginger juice. It is used in catarrh, sore-throat, cough, asthma, discharges from the ears and nose.

ACONITUM HETEROPHYLLUM

= अतिविषा =

(N. O.—RANUNCULACEAE)

Vern. Sans.—Ativisha. **Hind.**—Atis. **Tam.**—Ati-vadayam. **Tel.**—Ati-vasa ; **Guz.**—Ativish or Ativakh. **Mar.**—Ativish.

Habitat.—Sub-alpine and Alpine zones, the Himalayas from Indus to Kumaon.

Parts Used.—The dried tuberous roots.

Collection & Storage.—The drug is collected in the higher Himalayan dry regions and it should be kept in a air-tight dry place, as the drug deteriorates on keeping in the hot moist atmosphere of Bengal.

Chemical Composition.—An intensely bitter alkaloid, *atisine*, tannic acid, pectous substance, abundant starch, fat, a mixture of oleic, palmitic, stearic glycerides, vegetable mucilage, cane-sugar and ash 2 per cent. Atisine is intensely bitter but non-poisonous. (See Appendix).

Physiological Action.—Bitter, tonic, astringent, stomachic, antiperiodic and aphrodisiac. *This is the only non-poisonous aconite.*

Dose, Powder of root :— 10 to 30 grains.

Therapeutics.—It is valuable for combating debility ; and after fevers, it is an excellent tonic. It is very efficacious in diarrhoea, dysentery, acute inflammatory affections etc ; also in cough, dyspepsia and diarrhoea depending thereon.

Sarangadhara recommends the following decoction in fever with diarrhoea—Take of *atis*, ginger, kurchi bark, tubers of *Cyperus rotundus* (*mustāḥa*) and root of *tinospora cordifolia* (*gulanḥa*), equal parts, in all two tolas, water thirty-two tolas. Boil till the water is reduced to eight tolas. This quantity is given in two or three divided doses during the course of the day.

Chakradatta recommends the following compound powder in similar cases :—Take of *atis*, tubers of *Cyperus rotundus* (*mustāḥa*) and the horny excrescence of *Rhus succedanea* (*ḥaḥātasringi*), equal parts ; powder and mix. This compound powder is given in doses according to age, (adult dose 10—20 grains) with addition of

honey. Sometimes, long-pepper is added to the above ingredient, when the powder is called *Bala-chaturbhadraka* (बालचतुर्भद्रिका).

The plain powder of the tuberous root mixed with honey is given in cough, coryza, fever and vomiting of children; it is applied to the tongue, dose being strictly according to age.

It has been given as an antiperiodic in malarial fevers with some success, but is much inferior to quinine. Combined with Vivadang (विडङ्ग), it is given to expel worms. Dr. M. Sheriff considers that the ordinary doses are only useful as a tonic and that two drams or more should be given as an antiperiodic,

ACORUS CALAMUS

TWO VARIETIES.

= वचा =

(N O.—AROIDÆÆ)

Bach—(White variety) Vern. *Sans.*—Shadgranth (six-knotted) *Beng.*—Khorasani Bach. *Hind.*—Khurasani Bach, Safeda Bach *Guz.*—Balabaj. *Tel.*—Wadaja.

(Red variety). Vern. *Sans.*—Uragandha. *Beng.*—Bach. *Hind.*—Kulanjan *Tel.*—Vasa. *Guz.*—Goda-vaj. *Tam.*—Vashambu.

Habitat.—A semi-aquatic growing in damp, marshy place, and indigenous to Burma and India.

Parts Used. The dried rhizome.

Chemical Composition. A volatile oil. *acorin*, a bitter principle—*acoretine* (choline), *calamine* (useful in dysentery), starch, mucilage etc.

Collection and Storage.—Should be kept in a dry place, as moisture may not deteriorate it.

Physiological Action.—Bitter, aromatic stimulant, tonic, carminative, expectorant, antispasmodic, and nervine sedative; in large doses i.e. 30 grains, it is nauseant and emetic.

Dose.—Powder. 5 to 15 grains as digestive and expectorant and 40 to 80 grains as emetic. Infusion (1 in 10 parts of boiling water) dose. 1 to 2 ounces.

Therapeutics—Externally.—It is used in chronic rheumatism, the root being powdered and rubbed with the spirits made from the Cashew-nut fruit and as counter-irritant to the chest in the catarrh of children. The root burnt to cinder, mixed with cocoanut or castor oil and smeared over the abdomen, relieves flatulent colic.

Internally.—Given in the form of *infusion*, it is useful in habitual constipation, atonic dyspepsia, loss of appetite, colic and flatulence ; as antiperiodic, it is given in tertian fevers. It is an useful adjunct to bitter and stomachic infusions. With the addition of a little liquorice root, it is administered in cases of cough and capillary bronchitis, especially in children. A small piece is given to chew for a few minutes to allay distressing cough. In asthma, it is useful in small doses of 10 grains repeated every two or three hours till relief is obtained. It is used as a diuretic in calculous affections and as an anthelmintic in worms in children. With bhang and ajowan in equal parts it is powdered and used as a fumigation to painful piles. As an astringent, it is given in dysentery and diarrhoea. It is eaten freely during the prevalence of any epidemic, as it is supposed to be an antidote to several exanthems. The powder is a very effective insecticide, keeps moths from woollen goods and fleas from rooms. It is also beneficial in hysteria and neuralgia. The following is a valuable compound powder useful in dyspepsia and as a stimulant in low fevers, epilepsy and insanity.

Take equal parts of Acorus Calamus root, asafoetida, *atis*, long-pepper, black-pepper, ginger, chebulic myrobalan and sochal salts. Powder and mix them well together. Dose : 20 to 60 grains.

Bach is given to children to bite to promote teething. For increasing memory and longevity, a bolus of powdered bach is to be mixed with Brahmi Ghee and taken on empty stomach ; after digestion of the medicine, rice and milk should be taken. If continued for a long time, the memory is said to become sharpened ; and the retentive power and the span of life are said to increase.

ADHATODA VASIKA.

= वासक =

(N.O.—ACANTHACEÆ.)

Vern: *Sans.*—Arusak (not angry) Vasa (giving perfume),*Eng.*—Malabar nut. *Beng.*—Bakas, Vasaka. *Hind*—Arusha.*Pers.*—Bansa. *Tam.*—Adhadode. *Tel.*—Adasara.**Habitat.**—This plant grows in most parts of India.**Parts Used**—The leaves, root, flowers and bark.**Chemical Composition.**—Contains an odourous principle, fats, resin, a bitter alkaloid "Vasicine" and an organic acid "Adhatodic acid." sugar, gum, colouring matter etc.**Collection and Storage.**—The plant is usually collected before the flowering season i. e. during November and December.**Physiological Action.**—Antispasmodic, expectorant, diuretic and alterative. It is a respiratory sedative (see appendix.)
"Bakas leaves are poisonous to animalcules, frogs, leeches etc. ; on the higher animals, the leaves do not have this effect.**Dose.**—Fresh juice of the leaves 2 to 4 drams ; powder of the root bark 10 to 30 grains. Decoction (1 in 10) two to four ounces.**Therapeutics. Externally :**—Its strong decoction is an efficacious fomentation to rheumatic and painful swellings and neuralgias ; it is also a good application for scabies and other skin complaints. The dried leaves are smoked as cigarettes with much benefit in asthma. The fresh flowers are bound over the eye in ophthalmia.**Internally.**—In chronic bronchitis, asthma and other pulmonary affections, when not attended with febrile reactions, the drug is a very useful (sedative.) expectorant. The addition of long pepper seems to increase its efficacy. This medicine was considered so serviceable in Phthisis that it was said that "no man suffering from this disease (i. e. Phthisis Pulmonalis) need despair as long as the Vasaka plant exists." (Hindu Materia Medica.)

The juice of the leaves is considered especially useful in Haemoptysis and is given with honey.

Other parts of the plant.—The *flowers and fruits* are bitter, aromatic and antispasmodic. The flowers are useful in hectic heat of blood and Gonorrhoea. The fruit is sometimes hung round the necks of children to keep them from catching cold. The root is useful in cough, asthma, febrile disturbances and gonorrhoea. It is a good substitute for Senega Root.

The flowers, leaves and roots (especially the first ones, as they have got antispasmodic properties) are prescribed in certain cases of asthma and to prevent the return of rigor in intermittent fever. They are bitterish and sub-aromatic and are administered in infusion or electuary. *Vasavaleha* (वासावलेह) or electuary of *vasaka*—is prepared thus :—Take of the juice of *vasaka* leaves four seers, white sugar one seer, long-pepper sixteen tolas, clarified butter sixteen tolas ; boil them together till reduced to the consistence of an extract ; when cool, add honey one seer and stir, till intimately mixed. *Dose* is one to two tolas in phthisis, cough with pain in the sides, haemoptysis and asthma (Bhavaprakash).

Sarangdhara describes the following compound decoction of the root of *adhatoda vasika*, much used in fever with cough.—Take of equal parts, *vasaka* root, *gulancha* and the root of *So'anum Jaquini* (*Kantakari*) two tolas in all, and prepare a decoction in the usual way. This is given with the addition of honey. *Dose*—1 to 2 ounces.

AEGLE MARMELOS.

= बिल्व =

(*N. O.* —RUTACEÆ)

Vern. *Sans.*—Bilva. *Beng.*—Bel. *Hind.*—Bel, Sriphal;
Eng.—Bael fruit, Bengal quince. *Mar. & Guz.*—Bil, bel. *Pers.*—
Shul. *Tam.*—Beli. *Tel.*—Maredu, bilva-pandu, patir. *Sind.*—
Bila, Katori. *Mal.*—Kuvalap-pazham. *Kan.*—Bilapatri. *Gond.*
Maika, mahaka.

Habitat.—Found all over India, from sub-Himalayan forests to central and south India.

Parts used.—The fruit (both ripe and unripe), root-bark, leaves, rind of the ripe fruit. The unripe dried fruit is used in the powder form as well.

Collection and storage.—It should be kept in a dry place.

Chemical Composition.—The bael contains mucilage, pectin, sugar, traces of tannin, bitter principle and volatile oil (*Pharmaceutical Journal*,) The fresh leaves, on distillation, yield an oil of a yellowish green colour and neutral reaction, of an aromatic odour and bitter taste.

Physiological action.—The unripe and half-ripe fruit is astringent, digestive and stomachic. It is not improbable that its action is that of a mild stimulant to the intestinal mucous membrane, as experience has shown that while it tends to arrest diarrhoea when present, it no less certainly acts as a laxative when constipation exists; under each circumstance, it tends to give tone to the intestinal tubes.

Dr. Kanailal Dey notes that the astringent action is not due to the traces of tannin present but is due partly to pectin and the clear mucilage which surrounds the seeds and partly to the astringent acids present in the unripe fruit.

The ripe fruit is nutritious, delicious, aromatic, alterative and laxative. The pulp is stimulant, antipyretic and antiscorbutic.

Dose of the powder.—As a remedy in dysentery, from 20 grains to 1 dram 4, 5 or 6 times a day; and for all other purposes, 10 to 20 grains.

Dose of the Syrup.—2, 4 or 6 fl. drams 3, or 4 times in 24 hours.

Therapeutics.—The unripe fruit is regarded as astringent, digestive and stomachic and is prescribed in diarrhoea and dysentery with debility of the mucous membrane, often proving effectual in chronic cases after all other remedies have failed. It seems specially useful in dysentery where there is a scorbutic taint, as well, such as is found in the Indian jails. To check the frequency of evacuations the powder is given with opiates or other astringent medicines.

The pulp of the green fruit, softened by roasting and sweetened with sugar-candy, is useful in chronic diarrhoea and dysentery. In

acute dysentery it is not so useful, owing to the rapidity with which inflammation proceeds and grave ulceration supervenes.

The pulp of the fresh fruit mixed with milk and administered with cubeb powder, acts as diuretic and astringent on the mucous membranes of the generative organs ; therefore is useful in chronic gonorrhoea. The small unripe fruit is given with fennel seeds and ginger in decoction for piles.

Moodeen Sheriff notes that the powder is more useful in acute disease and syrup in chronic disease. In acute dysentery, the powder should be administered in much larger doses than in any other disease.

The powder of unripe Bael fruit is also useful in relieving the febrile symptoms in all forms of indiopathic fevers, including hectic and typhoid. The abnormal temperature in febrile conditions is reduced under its use in a very remarkable manner.

The Ripe fruit.—Is sweet, aromatic and cooling ; made into a sherbet and cooled with ice, it is pleasantly laxative, and a good simple cure for dyspepsia, and is useful in febrile affections. In excess, it often causes flatulence. The dried ripe fruit is mildly astringent and may be used in dysentery. A useful popular preparation (bael marmalade or bael *morubba*) may be taken like jam at the breakfast table in convalescence from chronic dysentery and diarrhoea.

The root bark is made into a decoction and used for the cure of intermittent fever, hypochondriasis, melancholia, and palpitation of the heart. The decoction of bael root is given with sugar and fried rice for checking diarrhoea and gastric irritation in infants. The root is said to be an antidote against poisonous snake bite. It is one of the "Dasamula". It has also got a laxative effect.

The fresh juice of the leaves is bitter and pungent and acts as a mild laxative in cases of fever and catarrh and probably acts as a curative. It is rubbed over the body to remove the offensive smell, due to excessive perspiration (esp : in fat subjects) The decoction of the leaves is used as a febrifuge and expectorant. As an expectorant it is used in asthmatic complaints, and with addition of black pepper in anasarca associated

with costiveness and jaundice. Two tolas of the juice of the bark is given with a little cummin in milk, as a remedy for poverty of the seminal fluid. In indigenous practice, a poultice of the leaves is applied to the chest in acute bronchitis, and applied heated to the head in the delirium of fevers. For a child the following is an excellent prescription in cases of chronic diarrhoea—(1) Powder of unripe fruit 6 grs, compound powder of kino-gr. 1, pure white sugar-gr. 1. Mix together. One dose to be taken 2 or 3 times a day.

(2) Rind of the Bael fruit 5, gulancha 4 parts. Mix and make a decoction. When ready, add honey. Given to check vomiting.

(3) Dried bael 1 dr, catechu 1 dr, pomegranate bark (dried) 1 drachm. Mix and make a powder, **Dose** :— $\frac{1}{2}$ to 1 drachm. Used in dysentery and chronic diarrhoea.

A compound powder (अतिसार नाशक चूर्ण) is prepared with equal parts of dried *bela*, tubers of *Cyperus rotundus* (*mustaka*), flowers of *Woodfordia floribunda* (*dha'taki'*), root of *Stephania hernandifolia* (*pa'tha'*), ginger and *mocharasa*. It is given in doses of twenty to forty grains with butter-milk and treacle. In the dysentery of children, a decoction and an electuary of the following drugs is used, namely dried *bela*, fruits of *Pothos officinalis*. (*gajapippuli*), root of *Pavonia odorata* (*bala'*), flowers of *Woodfordia floribunda*. (*dhataki*), and bark of *Symplocos racemosa* (*lodhra*), in equal parts.

ALLIUM CEPA.

= पलाण्डु =

(N.O.—LILIACEÆ)

Vern.—*Sans.*—Palandu. *Eng.* Onion. *Hind.*—Piyaz. *Beng.*—Piyaz. *Guz.*—Dungari *Mar.*—Kanda. *Tam.*—Vengazam, irulli. *Tel.*—Vulli-gaddalu, niruli. *Kan.*—Vengazam, nirulli, Kumbali. *Mal.*—Bawang. *Burm.*—Kyei-th-woni-ni.

Habitat.—Cultivated all over India.

Parts Used.—The bulb

Collection and Storage.—Seeds will not keep in India for more than one season, hence selected bulbs are planted at the beginning of the cold season. Patna and Bombay are famous for their onions, and speaking generally, the onions from the northern provinces are the largest and best. The bulbs should be kept in a dry, airy place, otherwise the moist heat of Bengal will help them to rot.

Chemical Composition.—The bulbs contain an acrid volatile oil, which contains sulphur. The outer skins of the bulb contain a yellow colouring matter, Quercetin. It contains no appreciable amount of starch and an infinitesimal amount of sugar ; It contains rather large quantities of cellulose, more particularly in the outer layers.

Physiological Action.—The oil contained in the bulb is stimulant, diuretic and expectorant. It slows the heart and increases the flow of urine. It is excreted by the bronchial, genito-urinary and gastro-intestinal secretions. The bulb is emmenagogue. Externally it is stimulant and rubefacient. Roasted it acts as demulcent both internally and externally. The juice of the onion is aphrodisiac. Its peculiar characteristic sulphur compound, is believed to stimulate the flow of digestive juice and to act as a mild laxative.

Therapeutics.—*Externally.*

(1) Roasted or otherwise, they are applied as poultice to indolent boils, bruises, wounds etc, to relieve heaty sensation.

(2) Juice is used like smelling salts in faintness, epileptic and hysteric fits.

(3) It is dropped hot into the ear to relieve ear-ache.

(4) It is sniffed in epistaxis.

(5) It is locally used to allay irritation of insect-bites, scorpion stings and also in skin diseases.

(6) Mixed with mustard oil in equal proportion, it is used as a liniment to allay rheumatic pains.

Internally.—

(1) The bulbs are used in fever, dropsy, catarrhal and chronic bronchitis.

(2) Mixed with common salt, the onions are a domestic remedy in colic and scurvy.

(3) Eaten raw they are emmenagogue.

(4) It is used as antiperiodic and is said to mitigate cough in phthisis, and mixed with vinegar, it is used in sore-throat.

(5) As an expectorant, it is given in chronic bronchitis, whooping-cough, asthma cough and catarrhal affections as roasted bulbs with food.

ALLIUM SATIVUM

= रसोन =

(N. O. LILIACEAE)

Vern. *Sans.*—Lasuna. Mahaushadha. *Eng.*—Garlic, *Beng.*—Rasun. *Hind.*—Lassun. *Mar.*—Lasun. *Tam.*—Vallai-pundu. *Tel.*—Velluli-talla-gadda. *Kan.*—Belluli. The best kind sold in Bombay is called "Goghari lusoon."

Habitat.—Cultivated all over India.

Parts Used.—The bulb.

Collection & Storage.—It is planted out in October and the crop gathered in the beginning of the hot weather ; to be kept in a dry ventilated place.

Chemical Composition.—An acrid volatile oil, starch, mucilage, albumin, sugar etc. The drug owes its property to the volatile garlic oil it contains.

Physiological Action.—Stimulant, emmenagogue, expectorant, anti-rheumatic and alterative. The medical properties are due to the oil, of which the dose is $\frac{1}{2}$ to 2 minims. Externally, the bulb is used as resolvent. Garlic acts as vermifuge, expelling round-worms. It causes copious diuresis. It stimulates appetite and promotes digestion, expelling flatus. It quickens the circulation, excites the nervous system and acts as a tonic and carminative.

Therapeutics. *Externally.*

(1) As a local stimulant and irritant, it reddens the skin and causes vesication.

(2) It is applied to the nose of hysterical girls when in a state of swooning.

(3) It is applied to the bites of venomous reptiles,

(4) It is largely used as a liniment in infantile convulsions and other nervous spasmodic affections.

(5) It is used as a poultice in retention of urine from debility of the bladder.

(6) Bruised garlic and onions are applied to the chest as a poultice or liniment.

(7) It is rubbed over ring-worm with relief.

(8) Garlic juice slightly warmed is used as a local application in otalgia.

(9) A bulb of garlic is sometimes introduced into the meatus of the ear for relief of pain in the internal ear.

(10) Mustard or cocoanut oil in which garlic has been fried is an excellent application for scabies, and maggot infesting ulcers.

Internally—

(1) As a gastric stimulant, it aids digestion, and is given in flatulence.

(2) As an emmenagogue, it promotes the flow of menses.

(3) Given with common salt it relieves colic and nervous headache.

(4) As a vermifuge, it expels round worms.

(5) It causes copious diuresis and is hence used in dropsy or anasarca.

(6) Mixed with vinegar, it is used as an astringent in relaxed sore-throat, and relaxation of the vocal cords. It is also used in asthma, general paralysis, facial paralysis, gout and sciatica.

(7) A decoction of garlic in milk is given in small doses in hysteria, flatulence, sciatica and heart disease.

(8) After intense fatigue, a clove of garlic slowly chewed and swallowed acts as a very powerful restorative.

(9) In the form of confection, it is given in rheumatism.

(10) It is regarded as a stimulant, expectorant, tonic and employed as a remedy in bronchial affections.

(11) It is an efficient prophylactic in tuberculosis

ALOE BARBADENSIS

= घृतकुमारी =

(A. O. LILIACEAE)

Vern. Sans. Kumaree. **Eng.**—Indian aloes. **Hind.**—Ghikanvar. **Beng.**—Ghrit-kumari. **Guz.**—Kunvar. **Tam**—Kattalai. **Punj.**—Elwa. **Tel.**—Kalabanda.

Habitat.—Cultivated throughout India in many varieties, some of which run wild, as on the coasts of South India.

Parts Used.—The expressed and dried Juice of the leaves and pulp.

Collection and Storage.—The plant grows all over India as pot herb and is easily procurable ; the dried inspissated juice is called *Musabbar*.

Chemical Composition.—Aloin ; resins 30 to 50 p.c., volatile oil and ash 1 p.c. The odour is due to volatile oil.

Physiological Action.—Stomachic, tonic in small doses ; in large doses purgative and indirectly emmenagogue. It acts chiefly on the lower half of the large intestines and especially on the rectum producing copious soft stools with some griping and pain. It diffuses into the blood and is eliminated by the mucous membranes of the colon.

Dose of inspissated juice—2 to 4 grs. Fresh pulp— $\frac{1}{2}$ to 1 ounce.

Therapeutics.—*Externally.*—

(1) It is rubbed round the navel to open the bowels in young children.

(2) In glandular enlargements and spleen diseases, the juice of the leaves is given with the addition of powdered turmeric.

(3) Mahomedan physicians consider it as a collyrium ; it strengthens the sight and removes styes of the lids ; it is often applied for the dispersion of swellings and the promotion of granulations.

(4) Dissolved in attar of roses, or in water with borax and a little opium added, strained, the water or lotion is applied to eyes

in various affections of the eye, as in catarrhal and purulent ophthalmia.

(5) Dissolved in spirit, it is used as hair-lotion to stimulate hair-growth.

(6) The juice of the leaves is applied to inflammation.

(7) In case of burn, its fresh pulp is soothing and useful.

Internally.

(1) It is commonly given with honey to children (newly born) to hasten expulsion of the meconium.

(2) As an enema it is used to expel ascarides.

(3) A sweet confection prepared from the pulp of the leaves is given in piles.

(4) The pulp with honey is given in coughs and colds. To correct its griping effect, confection of roses and mastich is added.

(5) In colic and pneumonia of infants its *inspissated juice* with a little gum assafoetida is given internally in doses of 1 grain ; it may also be given in mother's milk with the addition of a little borax.

(6) The fresh juice is much used in making up various sorts of pill-masses, mostly of a purgative character.

(7) Aloes with myrrh, nux vomica, and iron is useful in amenorrhoea, hypochondriasis, atonic dyspepsia, and constipation.

(8) In jaundice, snuff of its juice is beneficial.

(9) The juice of its leaves one tola, with powdered turmeric (10 grains) is used for Gonorrhoea.

(10) Sexual power is greatly increased if the pulp is taken with honey. If it is taken alone, it promotes the action of liver.

ALSTONIA SCHOLARIS.

=सप्तपर्ण =

(*N. O.* APOCYNACEAE)

Vern. Sans.—Sapta-parna ; Visaltvak ; Brihattvaka **Beng.**—Chatwan, chhatin, chatiun. **Hind.**—Satiun, chatiun, satwin, satni. **Uriya.**—Chhatnia. **Kol.**—Chatin, bomudu. **Nepal.**—

Chatiwan. *Mar.*—Satvin. *Tam.*—Ezhilaippalai, wodrase. *Tel.*—Palagaruda¹

Parts Used.—Bark.

Collection and Storage.—Bark should be collected from at least 15 years' old trees and dried in the shade and kept in a dry place.

Chemical Composition.—The bark contains the 'alkaloid "Ditamine," which ranks equal in therapeutical efficacy with the best "Sulphate of Quinine" and there are two others, known as "Ditine" and "Echitamine."

Physiological Action.—The action of Ditamine has been examined by Dr. Erich Hornack, who has found that in frogs it acts as a paralyzant to the motor nerve centres and motor nerve trunks and that it is also a paralyzant of the vagi. Upon mammals, its influence resembles closely that of curare; the peripheral nerve-endings are paralysed by it, as are also the peripheral vagi and vasomotor nerves.

Equal doses of Ditamine and quinine sulphate have got the same medicinal effects; besides, having none of the disagreeable secondary symptoms, such as deafness, sleeplessness and feverish excitement, which are the usual concomitants of large quinine doses; ditamine attains its effects swiftly, surely and infallibly. Therefore, it is used as an antiperiodic. It is also an astringent tonic and anthelmintic.

Doses:—*Powder of Bark* 5 to 20 grains.; of *Infusion* 1 to 2 ounces; of the *tincture* 1 to 2 drachms diluted in water and of *Ditamine* 5 to 10 grains.

Therapeutics. Externally.—The poultice of the powdered bark, with equal quantity of corn-flower, is useful in inflammatory affections.

Internally—Hindu Physicians describe it as a tonic, alterative, and useful in fever, skin diseases and Dyspepsia. It is now employed with most satisfactory results, where malignant fevers are prevalent, in place of sulphate of quinine.

In chronic Diarrhoea and in advanced stages of dysentery, it has proved very valuable. It has also been found effectual in

restoring the tone of the stomach and of the system generally, in debility after fevers and other exhausting diseases.

In catarrhal Dyspepsia, 15 grains are to be taken at bed time in powder or decoction,

The tincture of the bark acts in certain cases as a powerful galactagogue. In one case, the use of the drug was purposely discontinued at intervals and on each occasion the flow of the milk was found to fail.

The powder of the bark, (10 grain) with powder of *Tinospora cordifolia* (Gulantha 10 grains) and powder of chaulmoogra seeds (20 grains) is a very efficacious remedy in Leprosy. This compound powder is administered twice daily and forms the most convenient and efficacious treatment of the disease.

Susruta gives the following formula for use in catarrhal fever. Take of the bark *Alstonia scholaris*, *gulantha*, *nim* bark and the bark of *Betula Bhojpattra*, equal parts, in all two tolas and prepare a decoction.

In chronic Rheumatism it is used internally with black pepper.

ANDROGRAPHIS PANICULATA.

= कालमेघ =

(*N. O.*—ACANTHACEAE,)

Vern. *Sans.*—Kirata ; Bhunimba ; Mahatikta (king of bitters). *Beng.*—Kalmegh. *Hind.*—Kiryat. *Mar.*—Olen-kiraita. *Guz.*—Kiryato. *Tam.*—Nila-vembu. *Tel.*—Nela-vemu.

Habitat.—This is common in hedge-rows throughout the plains of India, cultivated in gardens in some parts, especially in Bengal.

Parts used.—The whole herb.

Collection and Storage.—The whole plant is collected towards the end of the rainy season till the onset of cold weather and dried in the shade.

Chemical Composition.—A green resinous extract is obtained by extraction with alcohol which is believed to be the active

principle. We call it Kalmeghin (Kalmagh Resin, Vide appendix.) in this extract an alkaloid is found to be present being about 0·6 p. c. of the crude plant. The drug also contains sodium and potassium salts.

Physiological Action.—The roots and leaves are febrifuge, stomachic tonic, alterative, anthelmintic and cholagogue. The whole plant is intensely bitter and yields its properties readily to water or spirit.

Dose :—*Dried leaves*.—about 10 grains (with 20 grains of blackpepper). *Succus* (expressed juice of the fresh leaves and stalks, 1 in 4 of the drug), Dose—10 to 60 minims. *Compound infusion* (1 in 20) containing orange peel and coriander, each 1 to 4 of the drug ; Dose:—1 to 2 ounces ; *compound pill* containing cumin, aniseed, cloves and greater cardamoms, all in equal parts mixed in the juice of Kalmegh. Dose.—2 to 5 grains. *Inf. Andrographidis* : Dose :— $\frac{1}{2}$ to 1 fl. oz. *Tinctura Andrographidis*. Dose— $\frac{1}{2}$ to 1 fl. dram. *Kalmegh Resin*. dose— $\frac{1}{2}$ to 2 grs.

Therapeutics. *Internally*—It is used as a tonic, stimulant and gentle aperient in the treatment of several forms of Dyspepsia and in the torpidity of alimentary canal.

The expressed juice of fresh leaves or the compound infusion is given with cardamom, cloves and cinnamon to infants, in general debility, in convalescence after fever and for the relief of griping pain with irregularity of the bowels and loss of appetite and in advanced stage of dysentery. *Brigade Surgeon G. G. Hunter* considers it superior to Quinine ; it is highly useful in sluggish liver, neuralgia, acts wonderfully well, as a strong, sure and safe cholagogue in gouty dyspepsia.

Tincture of the root is said to be stimulant and gently aperient. During epidemics of influenza, it is highly efficacious in arresting the progress of the disease ; is very useful in low remittent fevers of children, especially efficacious when combined with arsenic.

Other uses.—Green leaves are given with aniseed (4 to 20) as a stomachic and anthelmintic. It is the principle ingredient of the domestic medicine, called “Alui,” which is given to children for the relief of griping, irregularity of bowels and loss

of appetite. It is prescribed as follows:—Take cumin, aniseed, capsules of greater cardamoms.—pound them well with the expressed juice of the leaves of Kalmegh; the mass thus prepared is divided into small pills and dried in the Sun. One pill, rubbed down with human milk, is an ordinary dose.

Green leaves with the leaves of Aristolochia Indica and the fresh inner root-bark of country sarsaparilla, made into an electuary, is used by native hakims as a tonic and alterative in syphilitic cachexia and foul syphilitic ulcers.

ANDROPOGON MURICATUS.

= उशीर =

(N. O.—GRAMINEÆ)

Vern.—*Sans.*—Ushir. *Beng.*—Khas-khas. *Eng.*—Cuscus grass
Hind.—Khas, ba'la. *Guz.*—Va'lo. *Mar.*—Va'la. *Tam.*—Vette-
ve'r. *Punj*—Panni.

Habitat.—Is found throughout the plains and lower hills of India, Burma and Ceylon up to 400 feet, occurring on moist, heavy soils more especially the margins of lakes and streams.

Parts Used.—The whole plant, esp : the root.

Collection and Storage.—The root is of a reddish colour and often contaminated with red sand. Half distilled roots are frequently found in commerce and can be recognised by its light colour ; the dried plant should be preserved in a dry place.

Chemical Composition.—A volatile oil, resin, colouring matter, a free acid, a salt of lime, oxide of iron and woody matters. The roots when distilled with water yields a fragrant oil. It is the most viscid of essential oils and its sparing volatility, is taken advantage of in fixing other perfumes.

Physiological Action.—Tonic, stimulant, antispasmodic, diaphoretic, diuretic and emmenagogue.

Dose of Powder :—5 to 20 grains ; **Infusion** (1 in 40)—1 to 2 ounces. **Essencial oil or otto**—1 to 2 minims.

Therapeutics—Externally.—

It is used in a variety of ways ; a paste of the root is rubbed on the skin to relieve oppressive heat or burning of the body. The Red Sandal wood, *Pavonia odorata* (*balá'*), Padma Kasta together with a part of this plant, when added to a tub of water, makes up an aromatic bath.

It is used as preventive against cholera, being hung up in rooms and burnt as a fumigatory.

Internally.—

Medicinally the *powdered* root is cooling, refrigerant, diuretic, stimulant and tonic. The dose is 20 grains and of the *infusion* which is made by putting 2 drachms of the grass to ten ounces of water, the dose is from 1 to 2 ounces.

Being a cooling medicine in the form of infusion it is a grateful drink in fevers, inflammations and irritability of the stomach. It enters into the composition of several cooling medicines as for example, the preparation called *Shadanga paniya* (पड़ङ्ग पानीय) which contains *Cyperus rotundus*, *Andropogon muricatus*, red sandal-wood, *Pavonia odorata*, *Gingiber officinale* and *Oldenlandia Herbacea* (Bruised) two tollahs, boiled in 4 seers of water up to 2 seers. An infusion of the root is given as a febrifuge and a powder in bilious complaints.

Its essence or otto is given in two minim doses to check the vomiting of cholera.

The grass used in the from of *cigarettes* and smoked with benzoin relieves headache.

It is used in rheumatism, gout, given in flatulence, deranged menstruation, hysteria and convulsions.

ARGYREIA SPECIOSA.

= वृद्धदारक =

(*N. O. CONVULVULACEÆ*)

Vern. *Sans.*—Samudra palaka ; Vriddha-daruka. *Beng.*—Bijitarka. *Hind.*—samandar-sokh. *Eng.*—Elephant-creeper. *Santal.*—Kedok arak. *Tam.*—Shamuddira-pachchai. *Tel.*—Samudra-pála.

ARGYREIA SPECIOSA

Habitat—Throughout India.

Parts Used.—The roots, seeds and leaves

Collection and Storage.—To be collected during early winter, when the creeper is in flower and fruits.

Chemical Composition.—Tannin, amber-coloured acid-resin, which is soluble in ether, benzole and partly soluble in alkalies.

Physiological Action.—The root is alterative and tonic. The leaves are nutritive and absorptive.

Dose :—Powdered root—10 to 30 grains. Powdered seeds—5 to 15 grains.

Therapeutics.—The *powdered root* is given in milk in synovitis and syphilis. The under surface of the *leaf* is used to hasten maturation and suppuration. The upper surface is supposed to possess healing qualities. As an alterative and nervine tonic, the *powdered root* is soaked seven times during seven days in the juice of the tubers of *Asparagus Racemosus* (*Satmul*) and dried. The resulting powder is given in doses of a quarter to half a tola with clarified butter for about a month. It is said to improve the intellect, strengthen the body and prevent the effect of age. Mixed with vinegar, the sap is rubbed over the body to reduce obesity.

Ajamodadi churna. (अजमोदाद्य चूर्णम्)—Take of *ajowan*, *baberang* rock salt, plumbago root, *cedrus deodara*, long pepper root, long pepper, black pepper and dill seeds each two tolas, chebulic myrobalan ten tolas, root of *Argyreia speciosa* twenty tolas, ginger twenty tolas ; powder and mix. Dose, about two drachms with treacle. This preparation is said to be useful in flatulence, rheumatic affections and hemiplegia.

ARISTOLOCHIA INDICA

= ईशाचरि (ईशेर मूल) =

(N. O. ARISTOLOCHIACEÆ)

Vern. Sans.—Rudrajata, Arkamula ; Ishv ari. **Beng.**—Ishormul.
Eng.—Indian Birth-wort. **Hind.**—Isharmul. **Tam.**—Peru-

marindu. *Tel.*—Ishvara-veru, Govila. *Guz.*—Sapsan. *Bomb. and Mar.*—Sapasand.

Habitat.—It is found all over india.

Parts Used.—The root, rhizome and leaves.

Collection and Storage.—The plant with root is obtained in the fresh condition, afterwards dried and kept in a dry place.

Chemical Composition.—It contains a volatile oil, tannin, a bitter principle (the Resin) and starch. The bitter resinous substance is the active principle of the plant and is soluble in alcohol and insoluble in water.

Pharmacological Action.—It is a bitter tonic, stimulant and emmenagogue. It is also considered to be attenuant, deobstruent and antarthritic. It is an equivalent of Serpentry Rhizome, The leaves are stomachic tonic and anti-periodic.

Dose :—*Powdered root*—5 to 10 grains. *Decoction* (1 in 10)— $\frac{1}{2}$ to 1 ounce. *Expressed juice of the leaves*—1 to 2 drachms.

Therapeutics. *Externally.*

(1) The plant boiled in oil is applied as a liniment to snake bite. It is said to be an antidote to snake poison.

(2) Rubbed with honey it is given in white leprosy.

(3) As a lotion, it relieves gouty pains.

Internally.—

(1) It is very useful in fever.

(2) It is administered, in decoction, in cold fevers, headache, flatulent distention and dysuria.

(3) The powder of the root, with pepper and hot water, stops bloody fluxes.

(4) It is a valuable medicine in the bowel affections of children when they are teething.

(5) The juice of the fresh leaves is very useful in the croup of children by inducing vomiting, without causing any depression.

ASPARAGUS RACEMOSUS

= शतावरी =

(N. O. LILIACEÆ.)

Vern. *Sars.*—Shata'vari, Shatamuli. *Beng.*—Shatamuli. *Hind.*—Sata'war. *Guz.*—Sata'vari. *Tam.*—Kila'vari. *Tel.*—Shata'vari. *Mar.*—Sata'vari-mul.

Habitat.—This climber is found all over India.

Parts Used.—The roots and leaves.

Collection and Storage.—It is generally used fresh but the roots are to be boiled and then dried to preserve them.

Chemical Composition—Large amount of saccharine matter and mucilage.

Physiological Action.—Nutritive, tonic, galactagogue, aphrodisiac, anti-spasmodic, diuretic, alterative, demulcent, anti-diarrhoeic and anti-dysenteric. The *bark* is poisonous.

Dose.—Root-juice—3 to 6 drams.

Therapeutics—The chief use of the drug however consists in the preparation of several popular cooling and emollient medicated oils for external application, in disorders of the nervous system, rheumatic affections and urinary diseases.

The root is boiled in milk and the milk is administered to relieve bilious dyspepsia and diarrhoea and to promote appetite. The boiled leaves smeared with ghee are applied to boils, eruptions of smallpox in order to prevent their confluence. The juice of this drug, taken with milk is useful in gonorrhoea. In combination with other diuretics, it is given in scanty urine. The following is an illustration. Take equal parts, of—the roots of *Asparagus racemosus*, *Saccharum spontaneum* (kasa), *Poa cynosuroides* (kusa), *Oryza sativa* (variety called *sali-dhanya*) and *Saccharum officinarum* (ikshu), *Batatus paniculatus* (vidari), *Scirpus Kysoor* (kaseruka), and *Tribulus terrestris* (gokshura), and prepare a decoction in the usual way. This decoction is administered with the addition of sugar or honey in scanty urine with heat.

As a tonic, it is given in seminal debility and pulmonary complaints.

One or two tolas of *Tinospora Cordifolia* (Gulancha) are mixed with equal portion of *Asparagus Racemosus*. It is to be taken with a little treacle, morning and evening. It is very useful for rheumatic fever.

The following combination is very useful for bleeding from urinary system :—Take green *Asparagus Racemosus* one tola, *Tribulus terrestris* (Gokshura) one tola, water one and half powa, cow's milk half powa. Mix and boil for half an hour. The decoction is to be taken morning and evening.

Root powder (dry) 15 to 20 grains are taken with one chattack cold water for dysuria.

The fresh juice of the root is given with honey as a demulcent in bilious dyspepsia or diarrhoea (Sarangadhara)

As an aphrodisiac, Chakradatta directs four seers of the juice of the roots and four seers of *ghee* to be boiled in forty seers of milk and to be flavoured with sugar, honey and long pepper. (*Satavari Ghrita*. शतावरी घृत) ।

BALSAMODENDRON MUKUL

= गुग्गुलु =

(N. O.—BURSERACEA.)

Vern.—*Sans.*—Guggula, Koushikaha. *Beng.*—Guggul, mukul. *Hind.*—Guggul. *Tam.*—Gukkulu. *Tel.*—Mahi-saksh gugal. *Eng.*—Gum-gugul, Indian Bdellium.

Habitat.—This tree is a native of Sind, Rajputana, Eastern Bengal and Assam.

Parts Used.—The gum.

Collection and Storage.—It is collected in the cold season by making incisions on the tree. Generally, the sap is let fall on the ground and therefore, the market commodity, is found full of dirt and should be used in medicine after purification. Bha'bamisra

describes the property of good googool as follows :—It will light up if put on fire ; it will melt if exposed to the Sun and it will become milky if put in boiling water.

Chemical Composition.—Volatile oil, gum-resin and bitter principle.

Physiological Action.—Alterative, demulcent, aperient, carminative, anti-spasmodic, emmenagogue and purifier of the blood.

Dose.—From half to one drachm.

Therapeutics.—*Externally.*—

(1) It is used in the preparation of an ointment for bad ulcers.

(2) Applied as a hot paste to incipient abscess, as an absorbent.

(3) As plaster, it is applied on the pit of the stomach for the relief of Hiccough

(4) Combined with black pepper and Colchicum, it is very useful in muscular rheumatism ; it is given internally, and also applied to the painful part as a *prolepa*.

Internally.—

(1) It is used in rheumatism, nervous diseases, scrofulous affections, urinary disorders and skin diseases.

(2) The compound pill known as *yogaraja guggula* (योगराज गुग्गुलु) is used as an alterative in enlarged glands in the neck, chronic rheumatism, dropsy and gleet etc. Dose—from half to one tola.

(3) Another preparation similar in composition is *Trayodasang guggula* (त्रयोदशाङ्ग गुग्गुलु) which is made with 13 aromatic adjuncts and is recommended for use in rheumatism affecting the loins and the sacrum.

(4) In rheumatism affecting the joints and bones, a preparation called *Adityapaka guggula* (आदित्यपाकगुग्गुलु) is used.

(5) *Triphala guggula*, त्रिफला गुग्गुलु is a simple household remedy, most useful in gonorrhoea, dropsy, fistula, foul ulcers, syphilis etc. It is prepared by taking of *guggula* 5, *triphalā* 3, *pipali* 1 and *madhu* (honey) sufficient to make a pill mass after mixing all together. **Dose.**—5 grs.

BERBERIS ASIATICA

=दारुहरिद्रा=

(N.O.—BERBERIDÆ.)

Vern. *Sans.*—Daruharidra. *Eng.*—Indian or ophthalmic Barberry; False Calumba. *Hind.*—Rasaut: Chitra. *Beng.*—Daruhalood. *Tam.*—Maramanjai. *Tel.*—Kasturi-paspu.

Habitat.—The barberry bushes grow on the Nilgiris and all over the Himalayas, whence the root and the root-bark can be obtained in large quantities.

Parts Used.—The root-bark and wood.

Collection and Storage.—It is imported from the hills, where it grows naturally. Pieces of white variety of wood, stained with turmeric, are mixed with it as adulterant. On section—the genuine wood has got uniform yellow colour, whereas the adulterants have got white colour inside.

Chemical Composition.—Contains a bitter principle “berberine” (alkaloid) in great abundance and starch.

Dose:—*Tincture*—(1 in 10.), 1 to 2 drachms. *Infusion* (1 in 20), 1½ to 3 ounces. *Extract* (1 in 8), 10 to 30 grains [*Rasanjana* or *Rusot*.—This is prepared from powdered stem by exhaustion with water, filtration and mixture with cow’s milk and final evaporation.]

Physiological Action.—Berberine in doses of 1½ grains given subcutaneously, killed rabbits with symptoms of prostration and fall of temperature; but a dose eight times as great given by mouth, has no action, and 15 grains only produce in man slightly colicky pains and diarrhoea. It causes contraction of the intestines and of the spleen and lessens oxidation in the blood (*Lauder Brunton*). The drugs which contain this alkaloid are very useful in malarial dyspepsia, accompanied by a febrile condition.

Therapeutics.—Tonic, anti-periodic, diaphoretic and alterative.

Powerful antiperiodic and febrifuge action has been confirmed by *Dr. Simpson* in fevers of this country (ague and remittent fevers). (*Ranking's Extract Vol 11. 1846, p. 411*)

Drs. Bennet and Simpson found this drug very efficacious for periodic neuralgia, and in some cases of Tic with complete success like quinine. *Dr. Piorry* preferred this preparation in the treatment of miasmatic fevers to quinine. When he found the spleen enlarged in a patient suffering from ague, intermittent or hectic, he gave *berberis* instead of quinine, and the fever abated in a few hours. (*Lancet vol I. 72, p. 498*).

Typaldo Lascarato experimented clinically on the action of this antiperiodic medicine, from which it appears to be a valuable aid in the treatment of splenic swellings of malarial origin. The action of *berberis* is due to the fact, that it produces a contraction of the tissues of the spleen which needs, however, careful watching, since excessive doses of the alkaloid are apt to cause rupture of the organ, which terminates almost invariably in fatal haemorrhage. The contraction of the spleen serves the purpose of ejecting its contents, and often the administration of *berberis* is immediately followed by a severe attack of fever which is probably due to the entrance of the malarial parasites into the blood circulation. This symptom favours the further development of the disease inasmuch as carefully watched, it furnishes the means of energetically suppressing the development of the parasites. This is effected with the aid of quinine which has been found from experience to act most energetically upon the parasites driven out in this manner, into the circulation of the blood. In those cases, where the spleen had already undergone degeneration, the treatment is naturally without avail.—*Lascarato* recommends the following formula as prescription of berberine.

Re. Berberine Hydrochlorate—grains 15

Quinine bi-sulphate—grains $7\frac{1}{2}$

Divide in 4 equal doses ; to be taken in wafers at intervals of half to one hour. (*E. Merck Annual Report 1899 page 44.*)

Dr. Stiven—recommends this as a diaphoretic and antiperiodic in the accession of the cold stage of fever after the bowels have

been thoroughly opened by a purgative. The effect produced by this remedy is as good as that produced by *Warberg's* fever drops.

Moodeen Sheriff observes :—As an antiperiodic and antipyretic it is at least equal to quinine and *Warberg's* tincture respectively ; as a diaphoretic, decidedly superior to *James'* powder. It is of the greatest service in relieving pyrexia and in converting continued and remittent fevers into the intermittent and also in preventing the paroxysm of the latter. In addition to its cheapness, its advantages over *Warberg's* tincture and quinine are that however repeatedly it may be used, it neither produces a great depression of the system nor has any bad effect on the stomach, bowels, brain and the organs of hearing. Unlike the alkaloids of cinchona it can be employed beneficially during an attack of fever. To ensure the full antiperiodic effect, the drug should not only be employed during the paroxysm but also in the same dose, every fourth or fifth hour, in the intermissions ; the cure is completed by the continued use of the drug in small doses, for 4 or 5 days more after the fever ceases to return.

It is very useful in chronic syphilitic and scrofulous cachexia, in chronic skin diseases specially of the scaly type, in convalescence from malarious and other fevers and in chronic uterine disease and also in menorrhagia.

By some it is believed to have a distinct action upon the Liver and is very valuable in chronic hepatitis. It is also very useful in cases of fever when bilious symptoms and diarrhoea are present. *Dr. D. D. Kar* says that it is contra-indicated when there is inflammation in the liver and in dysentery.

Rusot.—is an extract from the wood and roots of different species of berberis, growing in upper India. Combined with opium and alum it is much used and with great benefit in both incipient and chronic ophthalmia. Trials with it were instituted by *Dr. Wise* at the Eye Infirmary, Calcutta, and by *Mr. Walker* at the Edinburgh Eye Infirmary.

The cases in which it proved most effectual in *Mr. Walker's* hand were those of the Conjunctiva such as the simple catarrhal

and pustular forms of ulceration. The other affections benefited in a minor degree were simple rheumatic or catarrho-rheumatic inflammation and ophthalmia tarsi. Professor Simpson in his own practice in two cases of recent conjunctival ophthalmia found speedy relief and eventual cure by its means.

The mode of application consists in mixing equal weights of *Rusot* and alum and half the weight of opium with lemon or lime juice, till the mixture has got the consistency of cream and applying it round the eye-lids and over the eye-brows of the affected organ, repeating the application twice in 24 hours. Its application is attended with a considerable or even painful sensation of burning.

It is also mixed with honey as an application in aphthae and ulceration of the skin and mixed with milk it is dropped into the eye in conjunctivitis.

It is also used as a febrifuge and tonic by the people of this country in doses of $\frac{1}{4}$ to 1 dram.

The Root bark (रसञ्जनादि चूर्ण) —has been used in ague with good results.

Ras'anjana'di Churna, or compound powder of *rusot*. Take of *rusot*, atis, the bark and seeds of *Holarrhena antidysenterica*, flowers of *woodfordia floribunda* (*dh'itaki*) and ginger, in equal parts. Powder and mix. Dose, about a drachm with rice water and honey. This powder is said to be useful in bilious diarrhoea.

Oriental note _____

BOERHAAVIA DIFFUSA.

= पुनर्नवा =

(N. O.—NYCTAGINEÆ.)

Vern. Sans.—Punarnava ; Sothaghni. **Beng.**—Punarnaba. **Hind.**—Sant, Thikri. **Eng.**—Spreading hog-weed. **Tam.**—Mu'kku-rattai. **Tel.**—Atika-mamidi. **Mar.**—Kha'pra.

The Ayurvedic authorities recognise two **varieties** of this plant, the one with white flowers called *shweth-punarnava* and the other with red flowers, the *rakta-punarnava*.

Habitat.—Throughout Bengal and Chota Nagpur; extensively found during the rainy season.

Parts Used.—The whole herb, and the root.

Collection and Storage.—With the commencement of the monsoon, the plant sprouts up; during the rains, it grows and attains maturity with flowers and fruits and with the advent of the cold weather with fog, the plant shrinks up; therefore fresh *Punarnaba* is scarce except during the rains and autumn. It grows on moist high lands. The plant is to be carefully dried in shade and kept in a dry place for use when fresh plant is not available.

Chemical Composition.—It contains an alkaloid (*Punarnavin*); The amount of the alkaloidal body is very small. There are large quantities of Potassium Nitrate and other Potassium and sodium salts (see Appendix).

Physiological Action.—Bitter, stomachic, laxative, diuretic, expectorant and emetic. The root is purgative, anthelmintic and febrifuge. The active principle is a diuretic chiefly acting on the glomeruli of the kidney through the heart, increasing the beat and strength, and raising the peripheral blood pressure in consequence; on the cells of the tubules it exerts little or no action and, if any, it is only initial and comparative.

On respiration, it has little or no action, and if it is anything, it is probably due to the fatty principle found in the weeds.

On liver the action is principally secondary and in chemical combination with other drugs.

On other organs the drug has practically no effect. (Food and Drug, Oct. 1910. Dr. Lall Mohon Ghosal.)

Major R. N. Chopra with Mr. Sudhamoy Ghosh and Dr. B. N. Ghosh and Dr. P. De—made an exhaustive study of this drug and the report was published in Indian Medical Gazette, May, 1923—and the following conclusions were arrived at:—

(1) The active principle is a body of alkaloid nature, called *Punarnavine*. There are also large quantities of KNO_3 and other K Salts.

(2) Intravenous injection of the alkaloid in cats produces a distinct and persistent rise of blood pressure and marked diuresis.

(3) The diuresis is mainly due to the action of the alkaloid on the renal epithelium, although the rise in blood pressure may contribute towards it.

(4) Chemically 1 to 4 drams of the liquid extract made either from the dry or the fresh plant, produces diuresis in cases of oedema and ascites especially due to early liver, peritoneal and kidney conditions. When the liquid extract is used, the presence of a large amount of potassium salts no doubt reinforces the action of the alkaloid.

5. The drugs appear to exert a much more powerful effect on certain types of cases of ascites i. e., those due to early cirrhosis of liver and chronic peritonitis (Hale White) than some of the other diuretics known.

Doses :—(1) Fresh juice—2 to 4 drachms. (2) Powdered herb—30 grains to 1 drachm. (3) Decoc.—1 to 2 ounces.

(4) Ext. Punarnava Liq. (Cal. Tropical School formula)

Dose—2 to 4 drachms.

(5) Ext. Punarnava Liq. (non-alcoholic)

Dose—2 to 4 drachms. (See appendix)

Therapeutics.—*Dhanvantari* described the white variety in *Nighanta* as possessing laxative and diaphoretic properties. Its efficiency in oedema, anaemia, heart-disease, cough and intestinal colic has also been mentioned by him.

Raj-nighanta, another authority, recommended it in diseases of the nervous system, and *Bhabapraakash* in heart disease and piles. *Charaka* used it in the form of an ointment in leprosy and skin diseases, and as a decoction in stone in the kidney and in oedema. Local applications of the root paste have been recommended in oedematous swellings.

Sushruta mentions its use in snake poisoning and rat-bite infection.

Chakradatta used it in the treatment of chronic alcoholism and various other writers recommend it in phthisis, insomnia, rheumatism and diseases of the eye.

The drug may be given in any condition of the kidney where there is lessened secretion or where increased

secretion of kidney is wanted. Thus it may be given in all renal affections, with stoppage of secretion of kidney, in ascites, either from cirrhosis of liver or heart or kidney. As it increases the systole of the heart, it may be useful in all stenosed conditions of the valves, as by increasing the force and duration of the systole, it can pump all the blood from the heart; where there is dropsy and ascites due to weakness of the heart or to dilatation of the heart, this medicine may do much good by relieving the circulation through the kidney. In pleurisy and some such affections where there is accumulation of fluid in the cavities, the drug may be useful for increasing the quantity of urine.

The *juice of the leaves* is used in hepatic disorders, as in jaundice. The *root* is used in *powder* in drachm dose as laxative. *E. F. Waring*, in *Pharmacopoeia of India* says—It has been found a good expectorant and been prescribed in asthma with marked success, given in form of powder, decoction, and infusion in moderate doses. Taken largely, it acts as an emetic.

In infusion it is used as a vermifuge.

In dropsy the *decoction* of the root is administered with the addition of powdered chiretta and ginger and about 15 grains of nitrate of potash.

As a remedy for scorpion bites, it is applied externally. Powdered leaves are applied over oedematous swellings.

Decoction is very useful for insomnia.

As a diuretic it is useful in gonorrhoea.

BOMAX MALABARICUM.

= शाल्मली =

(N.O.—MALVACEÆ).

Vern.—*Sans.*—Shalmali; mocha. *Beng.*—Simul. *Eng.*—Red silk-cotton tree. *Hind*—Semul. *Uriya*—Bouro. *Tam.*—Mul-ilava-maram. *Tel.*—Mundla-buraga-chettu. *Mal.*—Mul-ilava-maram.

Habitat.—Throughout the hotter forest regions of India.

Parts Used.—The gum, seed, fruit, tap-root, bark, cotton and flower.

Collection and Storage.—The gum exudes only from those portions of the bark which have been injured by decay or by insects, since incisions in the healthy bark do not cause the gum to flow. The gum is best collected during the early part of the hot season from March till June since it has then lost most of its moisture, and consequently is less liable to ferment and deteriorate when it is stored.

Chemical Composition.—The seeds yield 25% of a sweet non-drying oil, which contains crystalline insoluble fatty acids. The cake of the seeds contains nitrogenous compounds, fat, extractive matter, woolly fibre and ash. The gum called *Mocharas* or *Supari-ka-phul* contains tannic and gallic acids.

Physiological Action.—The *gum* is astringent, aphrodisiac and styptic. The *tap-root* especially of the young plant is demulcent, tonic, slightly diuretic and aphrodisiac. The *bark* is demulcent, diuretic, tonic and slightly astringent. The bark and the root are emetic. The *roots* known as *Musla* or *Semul musla* have stimulant and tonic properties. The *flowers* are laxative and diuretic.

Dose :—*Gum*, 10 to 40 grains. Juice of the *root*—3 to 6 drachms. Dried *flowers*—1 to 2 drachms.

Therapeutics :—The *leaves* beaten and rubbed with water to a paste form useful application to glandular swellings.

The cotton is employed externally for its mechanical properties (softness and elasticity) in padding splints and covering burned and inflamed surfaces.

The *bark* is used externally in inflammations and cutaneous eruptions in the form of a paste.

The *petals* squeezed and soaked in human or cow's milk form a soothing application for conjunctivitis of infants.

The dry *young fruits* are beneficial in calculous affections and chronic inflammation and ulceration of the bladder and kidneys including strangury and all other forms of dysuria except those depending on mechanical causes.

The fruits are also useful in weakness of the genital organs and in most of the disorders in which gentian and calumba are resorted to.

The *gum* is useful in doses of 20 to 40 grains in dysentery, menorrhagia and diarrhoea of children. Indian women use it largely to stop menses during lactation. It is a chief ingredient in various restorative expectorant and aphrodisiac confection. In the dysentery of adults a decoction of *Bael* fruit in goat's milk is given with the addition of powdered *mocharas* and *indrajaya seeds*.

The dry *flowers* with poppy seeds, goat's milk and sugar, are boiled and inspissated, and of this conserve, two drachms are given three times a day in hæmorrhoids.

The *tap-root* is used for gonorrhoea, dysentery and menorrhagia; also in high coloured urine with copious deposits. As an alterative and restorative, a pak (confection) is used in tuberculosis of the lungs and other wasting diseases.

In the dysentery of children, the following is used:—Take of *mocharasa*, flowers of *woodfordia floribunda* (*dhataki*) root of *Mimosa pudica* (*lajjalu*), and the filaments of the lotus, equal parts, in all one tola, powdered rice one tola, water eleven tolas and boil together to the consistence of a gruel (*yavagu*) (Bhavaprakasa).

BUTEA FRONDOSA.

=पलास=

(N. O. LEGUMINOSÆ.)

Vern.—*Sans.*—Palas. *Beng.*—Pala'sh. *Hind.*—Dha'k, pala's. *Eng.*—Bastard teak. *Tel.*—Pala'shamu. *Tam.*—Murukkan-Maram. *Uriya.*—Porasu. *Behar.*—Paras. *Fr.*—Bute'a touffu.

The *seeds*, Pala's-ke-binj (*Hind.*), Murukkan-virai (*Tam.*), Moduga-vittula (*Tel.*) Pala'sha-che-bi (*Mar.*) The *gum*, Pala's-ki-gond, Kamarkas (*Hind, Beng.*), Pala'sha-gonda (*Mar.*), Muruk-kan-pishin (*Tam.*), Moduga-banka. (*Tel.*)

Habitat.—Mountainous districts of India and Burma and common all over Bengal.

Parts Used.—The gum, seeds, flowers, bark and leaves.

Collection and Storage.—Seeds are collected in April and May, when the fruits become fully matured. At first, the seeds are put into water. When they begin to swell, soft portions are taken out of them and well dried and kept in air tight containers. Gum is obtained by cutting its bark or sometimes from a hole naturally made into the trunk of the tree. When the gum becomes dry it begins to break and is easily powdered with a little pressure.

Chemical Composition.—The gum and bark contain kinotannic and gallic acids, 50 per cent ; soluble mucilage and ash 2 per cent ; on dry distillation it yields pyro-catechin. The seeds contain an oil which possesses anthelmintic properties. It is known as "Moodooga oil."

Physiological Action.—*Externally*, the seeds are rubefacient when pounded with lemon juice. *Internally*—The seeds are anthelmintic as well as purgative—a property which proves injurious to their full anthelmintic property. In some instances they have been found to excite vomiting and to irritate the kidneys. *Leaves* are astringent tonic, aphrodisiac and alterative. *Gums*—A powerful astringent and a good substitute for kino and may be used for all the purposes for which kino is used. *Flowers* are also astringent, depurative, aphrodisiac and diuretic.

Dose :—*Powdered gum*—10 to 30 grains ; of the *Seeds*—10 to 20 grains ; decoc. of *flowers*.— $\frac{1}{2}$ to 1 ounce.

Therapeutics.—*Externally*,—

(1) The use of the gum as an external astringent application is mentioned by Chakradatta, in the manner following : Take of red sandal wood one part, rock salt two parts, chebulic myrobalans three parts, and the gum of *Butea frondosa* four parts ; powder and mix. This powder is recommended to be applied to pterygium and opacities on the cornea.

(2) The seeds have been used successfully for the cure of a variety of eczema known as *Dhobie's Itch*. When made into a paste with lemon juice, it is used as remedy for ring-worm.

(5) A hot poultice made of leaves is used to disperse boils

and pimples. The decoction is used as an injection into the rectum in diarrhoea, dysentery, and into the vagina in leucorrhoea ; also used as a gargle in sore throat and ulcers of the mouth.

(4) Boiled in water and applied as poultice, *flowers* disperse swellings, promote diuresis and menstrual flow.

(5) The *bark* is given with ginger in snake-bites.

Internally.—

(1). Medicinally, the gum is an excellent astringent ; but being mild in operation, it is better adapted for children and delicate females. The dose of the powdered gum is from 10 to 30 grains, with a few grains of cinnamon. The addition of a little opium ($\frac{1}{2}$ to 1 grain) increases its efficacy.

(2) The fresh juice of the tree is very useful in Phthisis and in hæmorrhagic affections. It is also used as an application to ulcers and relaxed sore throat.

(3) As an *anthelmintic* the seeds are given in powder, 10 to 20 grains, thrice daily for 3 successive days followed by a dose of castor oil on the 4th day. It has the disadvantage of occasionally purging when its vermifuge properties are not apparent. For this, the seeds are soaked in water, shells removed and kernel is powdered, after being dried,

(4) In the *Bhābhāṇṇaka* the use of the seeds of *Ralasa* as an aperient and anthelmintic is noticed and, they are directed to be beaten into a paste with honey for administration.

(5) Leaves are astringent and alterative ; used in diarrhoea, pyrosis, sweating of phthisis, diabetes, menorrhagia, worms and colic.

(6) The water in which flowers are boiled is given with nitre in cases of difficult micturition in $\frac{1}{2}$ to 1, ounce.

Sarangadhara gives the following recipe for worms. Take of the seeds of *Butea frondosa*, root of *Ipomoea Turpethum* (*trivrit*), seeds of *Hyoscyamus niger* (*pa'rasika yama'ni*), *Kamala'* powder, *babrang* seeds and treacle, equal parts. beat them together into a paste with water and administer with butter-milk.

CALOTROPIS GIGANTEA AND PROCERA.

=आकन्द=

(N. O.—ASCLEPIADEÆ.)

Vern. *Eng.*—Gigantic Swallow-wort. *Fr.*—Arbre a soie. *Sans.*—Arka, Alark. *Beng.*—Akanda. *Hind.*—Ak, Madar. *Mar.*—Akra, Rui. *Tam.*—Erukku, Yercum. *Tel.*—Jilledu-chettu, Mandaramu. *Guz.*—Akado.

Habitat.—*Calotropis procera* and '*C. gigantea*, both pass by the native name of *madar*. "*C. procera* the smaller of the two, prefers the drier climate of the Deccan, the Upper Provinces of Bengal, the Punjab and Sindh ; '*C. gigantea*, lower Bengal, the Madras and 'Malayan Peninsulas and Ceylon." Sanskrit writers mention two varieties founded upon the colour of the flowers, namely white, called *alarka*, and red, called *arka*.

Parts Used.—The root-bark, leaves, juice and flowers.

Collection and Storage.—For medicinal purposes the root-bark should be selected from plants as old as possible in the hot or dry weather and the bark should not be removed as soon as the root is dug out, but 24 hours afterwards ; the thick, rough, corky epidermis of the bark should be scraped off before the root-bark is reduced to powder.

Chemical Composition.—The various principles of the *calotropis* bark are,—Madar alban, Madar fluavil, black acid resin, caoutchouc (free), yellow bitter resin (active principle). The sap of the *madar* plant contains in addition to caoutchouc two principles analogous to the alban and fluavil of gutta percha. Quantitative experiments by Drs. Hill and Sarkar have shown that the root-bark from the older plants has a higher percentage of acrid and bitter resinous matters than that from the younger plants. Therefore the older the plant the more active is its bark in its effects.

Physiological Action.—This drug acts like digitalis on the heart. The physiologically active substance is found in the milky juice of the plant. The root-bark is alterative, tonic, antispasmodic, expectorant and in large doses, emetic. Dose, as alterative, 3 to 10 grains and as emetic, 30 to 60 grains. This drug increases secretions (especially the evacuation of bile) and has a sedative action on the muscular fibres of the intestines (especially the colon and the rectum) allaying all pain, tenesmus and irritation and thus relieving all dysenteric symptoms. In syphilitic affections it is regarded as a great remedy so much so that it is called vegetable mercury. In intermittent fevers, it is used as antiperiodic, and diaphoretic, as it relieves the hot stage of fever by producing perspiration. The flowers are digestive tonic and stomachic in action. Given internally in small doses, the drug stimulates the capillaries and acts powerfully upon the skin; it is therefore likely to be useful in elephantiasis and leprosy. The benefit derived from the administration of the flowers in asthma is probably due to their nauseant action.

Dose.—*Inspissated juice*, 1 to 2 grs. *Root-bark*, 1 to 5 grs. *The juice of the leaves*, 1 to 5 drops.

Therapeutics.—*Charaka* recommended its root bark in piles; leaves to cover boils. *Sushruta* mentions its use in ear-ache, asthma, dog-bite. *Baghbhatta* used it in tooth-ache. *Chakradatta* used it in elephantiasis, hydrocele and scorpion-bite; *Bhabraprakash*, in enlargement of spleen.

Externally.—

(1) The root-bark, reduced to a paste with sour conjee, is applied to elephantiasis of the legs and scrotum.

(2) The milky juice is applied to carious tooth for relief of pain and to ulcer to hasten its healing.

(3) An oily preparation (*Arka taila*) made by boiling together 8 parts sesamum oil, 16 parts calotropis juice, and one part turmeric, is said to be useful in eczema and other eruptive skin diseases.

(4) In scorpion and insect bites, it relieves the pain and burning.

(5) As a depilatory it is used by tanners, also by women for removing hair from parts of body.

(6) It is a useful local application for the relief of painful joints and swelling and for ring-worm of the scalp.

(7) In combination with the wood of *Berberis Asiatica* it is used as a caustic for closing sinuses and fistula in ano.

(8) A powder of the dried leaves is dusted upon wounds to destroy excessive granulation and produce healthy action.

Internally.—(1) The dried flowering tops 2 to 4 grains pounded and boiled with molasses, are given every morning as a remedy for asthma.

(2) Fine powder of root bark is prescribed in cases of syphilis, lepra, hectic fever etc. Dose from grs. 3 to 5, three times in the day, gradually increased.

(3) A fluid extract of the leaves (1 in 1) is given in doses of 1 to 5 drops in intermittent fever during intermission.

(4) The dried flowers in 1 to 2 grain doses with sugar are given in leprosy, secondary syphilis and gonorrhoea with milk diet.

(5) 2 drachms dried root-bark are to be infused in half a seer of warm water. In syphilis and lepra, it is taken in dose of half a chattak (1 oz).

(6) The root-bark powder is a substitute for ipecacuanha in dysentery ; in doses of 5 to 10 grains it may be substituted for ipecac ; though double that quantity is generally required. With opium it forms a good substitute for the officinal Dover's powder.

(7) The tender laaves mixed with quarter the quantity of rock-salt are roasted within closed vessels so that the fumes may not escape. The ashes thus produced are given with whey in ascites and enlargement of the abdominal viscera in doses of 10 to 20 grains.

(8) Take equal parts of its branches, leaves, milky juice and flowers. Press them well and make pills (of the size of a pea.). They have to be dried in the Sun. One pill is to be taken every morning, in various kinds of skin diseases.

(9) If the root of white Akanda is taken with Black pepper, it will destroy the poison of snake bite in doses of 5 to 10 grains.

CANNABIS SATIVA

=गञ्जा, भङ्गा=

(N. O. URTICACEÆ.)

Cannabis Indica B. P.

Vern. Sans.—Vijaya, Bhangā, Ganja, Indra'sana. **Beng.**—Siddhi, Bha'ng. **Hind.**—Bha'ng, Ganja. **Arab.**—Kinnab. **Pers.**—Da-arakte-bang. **Guz.**—Ganja. **Tel.**—Ganjayi, Jadaganja. **Tam.**—Madamattagam. **Eng.**—Indian hemp.

Parts Used.—(1) *Ganja*, dried flowering tops of the pistillate or plants. (2) *charas* (charas) or resinous exudation of cannabis. (3) *Bhang*, *Siddhi*, the leaves, (4) an edible seed from which fatty oil can be expressed.

Habitat.—India, Persia, Southern Europe, America and Africa.

Collection and Storage :—The plant attains its highest therapeutic power when grown in tropical or sub-tropical climates, inasmuch as it develops there a larger content of resin than elsewhere.

The plant is required to be harvested before becoming quite ripe, owing to liability to seedling. The seed loses its germinating power very quickly, hence the stock should be of one season old only. Indian seed is smaller and darker coloured than that of Europe. It should be used fresh.

Description of the different products.

(1) *The leaves (siddhi)*—The dried leaves as met with in the Abgari Shops usually consist of a powder known as "Siddhi" and is composed of fragmentary leaves with bits of inflorescence as well with even of the seeds. When prepared for consumption, these fragments are ground to paste and of this an emulsion is made which, after being strained through cloth, may be consumed as it is, or, flavoured with spices, cardamoms, melon seeds, sugar or milk.

(2) *Charas (resin)*—is a resinous substance that appears spontaneously on the leaves, stems, inflorescence and fruits of

hemp plant when cultivated in cold or dry climates. It is practically the active principle and consequently a more powerful drug than either *bhang* or *ganja*.—It is a greenish brown, moist, resinous mass, that possesses the peculiar odour of the hemp plant. When kept for sometime, it hardens, becomes friable and brownish grey in colour and when that earthy condition is fully attained, the drug is found to be inert.

(3) *Ganja (flowering tops)*—This is the dried flowering tops of the cultivated female plants, which become coated with a resinous exudation from glandular hairs, very largely it would seem, in consequence of being deprived of the opportunity of setting seed. To secure this result, therefore, the male plants are deliberately removed from the field at an early date.

As the female plants, begin to form inflorescence, all the large leaves on their stems and branches are also removed. The smaller leaves and bracts of the inflorescence become agglutinated and the manufactured article is valued very largely because of its freedom from leaves. The colour and smell are features of merit, but as a rule the *ganja* which has the least leaf, is regarded as the best.

It is almost exclusively used for smoking and is the more pernicious form of use than *bhang* or *ganja*.

(4) *Edible seeds*—Hemp seed is employed as a food for birds, poultry etc, and is recommended as an occasional diet for milch cows.

The seeds when expressed, yield 15 to 25 per cent of a pale limpid oil. The oil is at first of greenish yellow colour, but its colour gradually deepens when exposed to the air. Specific gravity ranges from 0.925 to 0.931. It becomes turbid at a temperature of 15°C. It absorbs from 143 to 144 per cent. of its own weight of Iodine.

The oil cake is used in feeding stock.

Chemical Composition.—The active constituent of cannabis is a reddish brown oil or resin, generally termed *cannabinol*. According to Frankel, the active substance is a phenol-aldehyde, the chemical formula of which may be expressed thus $\text{OH} \cdot \text{C}_{20}$

$H_{28}COH$. Cannabinol, however, appears to be merely a mixture of several resins and volatile oils, the exact nature of most of which has not yet been determined. Wood, Spivey described the entire resinoid exudation of Indian hemp as consisting of a terpene, a sesqui-terpene, a paraffin and cannabinol itself, of which they obtained 33% from one specimen of the "charas" and 16% from another. Choline is also known to be a constituent of cannabis; it is, possibly, the crystalline substance, *cannabine*, which is considered to be an alkaloid. According to Lees, watery extracts of the drug contain some active ingredient.

Physiological Action.—All parts of the plant are intoxicating, stimulant and sedative. In moderate doses the plant is at first exhilarant and aphrodisiac; after a while it is sedative. Its habitual use leads to indigestion, body-waste, melancholia and impotence. In large doses it first produces mental exaltation, intoxication, and finally loss of memory. On the whole, Indian hemp is feebly anodyne, strong exhilarant, diliriant and hypnotic; antispasmodic on muscles, aphrodisiac on genital organs and diuretic on kidneys. The leaf juice is diuretic. The leaves of *cannabis sativa* are regarded as heating, digestive, astringent and narcotic. Indian hemp is primarily stimulant, secondarily anodyne, antispasmodic and anaesthetic.

Dose of the flowering tops:—For a healthy young man $\frac{1}{4}$ to 1 grain. Taken every 4 or 6 hours. For a child, $\frac{1}{16}$ th grain. **Dose of the leaves**—5 to 10 grains.

Therapeutics. Externally.—(1) The leaves with milk are used externally as poultice for relieving haemorrhoids.

(2) The oil of the seeds is used as a liniment for rheumatic pain.

Internally.—(1) It is used internally in gonorrhoea, to the extent of a quarter drachm of bhang (leaf).

(2) The powdered leaves check diarrhoea and are stomachic.

(3) The leaves are used as an antidote to poisoning by opium.

(4) The tincture in doses of from 15 to 20 minims three times a day is used in acute dysentery.

(5) In sleeplessness, the powder of the fried leaves is given in suitable doses for inducing sleep and removing pain.

(6) *Ja'tiphala'dya churna* (जातीफलाम् चूर्णम्)—Take of nutmeg, cloves, cinnamon, cardamom, *tejpatra* leaves, flowers of *Mesua ferrea* (*na'gakesara*), camphor, sandal wood, sesamum seeds, bamboo manna, flowers of *Tabernoemontana coronaria* (*tagara*), chebulic and emblic myrobalans, long pepper, black pepper, ginger, leaves of *Pinus Webbiana* (*ta'lisha*), plumbago root, cumin seeds and the seeds of *Embelia Ribes* (*viranga*), equal parts, purified *bhang* equal in weight to all the above ingredients, and sugar twice as much as the *bha'ng*. Powder and mix. Dose, about twenty to forty grains. This preparation is given in diarrhoea, indigestion and loss of appetite.

(7) *Jva'la'nala rasa* (ज्वालानलो रस)—Take of *yava'sha'ra* and *sarjika'sha'ra*, (impure carbonates of potash and soda), borax, mercury, sulphur, long pepper, *Piper Chaba* (*chavya*) and ginger, equal parts, fried leaves of *cannabis sativa* equal to all the above ingredients, root of *Moringa pterygosperma*: half the weight of *bhang*; powder the ingredients, mix and soak the mixed powder for three days in each of the following fluids, namely a decoction or fresh juice of the leaves of *Cannabis Indica*, the roots of *Moringa pterygosperma* and *Plumbago rosea*, and dry in the sun. Then roast the mass lightly and make into a pill mass with the juice of the leaves of *Wedelia calendulacea* (*bhringa'raj*). Dose, about half a drachm with honey. This medicine is given in indigestion and loss of appetite with nausea and vomiting.

(8) Numerous confections of *bha'ng* such as *Kamesvara modaka* (कामेश्वर मोदक), *Madananda Modak* are considered aphrodisiac and are used in chronic bowel complaints and nervous debility.

Madananda Modak (मदनानन्द मोदक)—It consists of mercury, sulphur, iron each one tola, mica three tolas, camphor saindhab laṅḡan, nardostachys jatamansi (*Jatamansi*), Emblic myrobalan (*Amla*), elettaria cardamom (*Elachi*), ginger, long-pepper, black-pepper, nutmeg, laurus cassia (*daruchini*), cloves,

cumin seeds, glycerrhiza glabra (*Jastimadhu*), *Acarus Calamus* (*Vach*), *saussurea lappa* (*Pachak*), *curcuma longa* (*halud*), *cedrus deodora* (*devadaru*), seeds of *emgenia acutangula* (*hijjala*), *borax*, *Clerodendron Siphonanthus* (*Bamunhati*), *Mesua Ferrea* (*nagesar*), *Rhus Succedanea* (*Kakrasringi*). *Abies Webbiana* (*Talispatra*), *Vitis Vinifera* (*Drakhya*), root of *Plumbago Zeblandia* (*Chitamul*), seeds of *Baliospermum Montanum* (*Danti-bij*), *Sida Cordifolia* (*Barela*), *Sida Spiosa* (*Gorakchaulia*), *Cinnamomum Cassia* (*Dalchini*), *Coriandrum Sativum* (*Dhane*) *Scindapsus Officinalis* (*Gaj-pipul*), *Curcuma Zedoaria* (*Shati*), *Pavonia Odorata* (*Bala*), *Cyperus Rotundus* (*Moolhoo*), *Paederia Foetida* (*Gandha-bhaduli*), *Ipomoea Digitata* (*Bhuin-kumra*), *Asparagus Racemosus* (*Salamuli*), root of *Calotropis Gigenta* (*Akandamul*), seeds of *Mucuna Pruriens* (*Alkushi-bij*), *Tribulus Terrestris* (*Gokhru*), *Argyrea Speciosa* (*Bijtarika*), seeds of *Cannabis Sativa* (*Siddhi Bij*) each one tola. Keep all these in the juice of the *Asparagus Racemosus*. Dry and powder them. Mix them with the powder of *Bombax Malabaricum* (*Simul*) $\frac{1}{4}$ th quantity of the whole thing. Then mix them with powdered *Siddhi* (leaves of *Cannabis Sativa*), $\frac{1}{2}$ the quantity of the total amount. Press the whole thing with goat's milk. Then boil them in a mixture of goat's milk with sugar. Make it to the consistency with ghee and honey, so that bolus can be easily made.

CARUM CARUI

= शाजीरा =

(N O. UMBELLIFERÆ).

Vern. Sans.—Upakunchika. **Beng.**—Shia-jira. **Hind**—Siyah-jira. **Mar.**—Sa-jire. **Tam.**—Shimai-shiragam. **Tel.**—Sima-jilakara. **Eng.**—Caraway. **Fr.**—Carvi.

Habitat—As met with in India the fruits are generally imported, but the plant has been found to be cultivated in gardens as a winter crop.

Parts Used.—The seeds.

Collection and Storage—As met with in India, the fruits are mainly imported from Persia and Kirman and is to be carefully stocked in a dry place.

Chemical Composition—The seeds contain yellowish oil 1·5% and a fixed oil 37·5%, albumen, sugar, mucilage, organic acids etc. A valuable essential oil is obtained from its fruits. It consists of (1) *carvone*, which is the essential and odour-bearing body and possesses all the qualities of the drug in a pure form, and (2) terpene, a by-product not suitable for liqueurs but can be satisfactorily employed instead of caraway oil in medium and cheap soaps. The per centage of oil varies, according to cultivation and country of origin.

Physiological Action—Stomachic, carminative, stimulant, tonic, febrifuge, anthelmintic and emmenagogue.

Dose :—of the powder, from 5 to 10 grains.

Therapeutics.—(1) Caraway is recommended for painful swellings of the womb, and as a poultice for painful and protruding piles.

(2) It is very useful to patients who vomit blood with bile. It is to be taken on double its quantity of sugar.

(3) Bhabaprakash recommends it in intermittent fever. It is to be taken with old treacle.

(4) It is an aromatic adjunct to purgative and bitter remedies.

(5) A decoction of the seeds is given just after delivery to stimulate uterine contraction and increase the secretion of milk.

(6) In doses of 10 to 20 grs., it is useful in amenorrhoea. In large doses it causes abortion.

(7) It is serviceable in some form of dyspepsia and debility and also in some slight cases of fever in children. While taking this medicine for one of the above diseases, some children have been observed to pass out round worms. (Modeen Sheriff).

[The seed is employed both powdered and entire. In the former condition it is an important ingredient in curry powders ; in the latter it is put into cakes and biscuits.]

CARYOPHYLLUS AROMATICUS.

= लवङ्ग =

(N. O. MYRTACEAE.)

Vern.—*Sans.*—Lavanga. *Beng.*—Long. *Hind.*—Laung. *Eng.*—Clove tree. *Guz.*—Lavang. *Tel.*—Lavangalu, Lavanga-pu. *Tam.*—Karuvap-pu.

Habitat.—This tree is indigenous to the Konkan, Kanara and Malabar.

Parts Used.—The fruit, dried flower-buds and oil.

Collection and Storage.—Cloves are the dried unexpanded flower-buds of this tree. The corolla forms a ball on the top between the four teeth of the calyx, and the stalk is the immature ovary. They are at first green, then turn yellow and finally bright pink or scarlet. In this last stage they are ready to be picked. If allowed to remain longer on the tree, the flowers expand, become fertilised, and the stalk of the clove then develops into a succulent purple coloured berry containing one or two seeds. The cloves are cured by being smoked over a shallow wood fire, until they assume a deep brown colour; further drying is accomplished by the Sun. Occasionally the buds are scalded in hot water before being dried. The cloves which are sold in the bazars are devoid of oil, on account of being very old; sometimes oil is distilled out of them.

Chemical Composition.—A heavy volatile oil 16% to 20%; a camphor resin 6%, caryophyllin or eugenin—a crystalline substance (which is convertible into caryophyllic or eugenic acid with the aid of nitric acid), tannin (convertible into gallo-tannic acid), woody fibre, gum etc. Caryophyllin "occurs in silky stellate needles." The oil distilled from cloves contains (1) eugenol 85% to 92%, chemically resembling phenol. (2) A hydrocarbon, caryophylline.

Physiological Action.—*Externally.*

(1) When rubbed into the skin, it is stimulant, rubefacient, irritant, and counter-irritant and gives rise to considerable vascular

dilatation. At first it causes a sensation of tingling and pain, which afterwards is replaced by local anaesthesia. It is a parasiticide and antiseptic.

Internally.—Cloves are general stomachic, carminative, aromatic, and antispasmodic. They promote digestion (nutrition) and relieve gastric and intestinal pains and spasms.

Dose—of powder, 5 to 20 grains : of infusion (1 in 40 of boiling water) $\frac{1}{2}$ to 1 oz ; of oil, $\frac{1}{8}$ to 3 ms.

Therapeutics. Externally.—(1) The oil is used as an application in rheumatic pains, sciatica, lumbago etc.

(2) It is used in tooth-ache. Stuff the painful dental cavities with cotton wool moistened with a drop or two of clove oil.

(3) Cloves heated over flame, and kept in the mouth and its juice swallowed improves the breath and relieves sore-throat.

(4) It strengthens the gum.

(5) A paste of cloves applied to the forehead and to the nose-bridge relieves headache and coryza respectively.

Internally.—(1) They are used to correct griping caused by purgatives, to relieve flatulence, and to increase the flow of saliva.

(2) Combined with other spices and rock-salt, cloves relieve colic, indigestion and vomiting.

(4) An infusion of cloves, appeases thirst. (Chakradutta).

(5) Roasted cloves relieve irritation of the throat accompanied by hacking cough.

(6) A mixture of equal parts of cloves and chiretta has excellent effect in debility, loss of appetite and in convalescence after fevers.

(7) A powder called *Lavangadhi churnam*, (लवङ्गादि चूर्ण) made of equal measure cloves, dry ginger, black pepper and fried borax is useful in cough, asthma taken in 20 to 60 grains, three times a day. Gradually dissolved in the mouth and swallowed. This powder is macerated in the decoction of *Achyranthes aspera* and the roots of *Plumbago zeylanica* and made into pills of 5 grains ; 1 to 4 pills are taken three times a day in coughs and bronchitis.

CASSIA FISTULA

= सोन्डाल =

(*N, O. LEGUMINOSAE*)

Vern.—*Sans.*—Aragbadhu. *Beng.*—Sondhali. *Hind.*—Amalta's. *Eng.*—Purging cassia, Indian Laburnum. *Fr.*—Casse canéficier. *Tam.*—Konraik-kai. *Tel.*—Re'la-Ka'yalu. *Guz.*—Gurmala.

Habitat.—India.

Parts Used.—Root-bark.

Collection and Storage.—The pods are directed to be warmed, and the pulp is extracted ; but the pulp separated from the fruits does not keep well. A peculiar gum swelling up in water like tragacanth, issues from the tree when bruised.

Chemical Composition.—The pulp consists of sugar 60%, mucilage, astringent matter, gluten, colouring matter, calcium oxalate and ash.

Physiological Action.—The pulp, the root-bark, and leaves possess purgative properties. The root bark acts as purgative, tonic and febrifuge. The pulp is seldom used alone as purgative, as it causes colic, griping and flatulence. It is used as an adjunct to other purgatives. When given for a long time, it tinges the urine dark-brown.

Dose :—Infusion, 2 to 4 ozs. Pulp, 20 to 40 grs ; as a purgative, $\frac{1}{2}$ to 1 tola.

Therapeutics.—Charaka and Chakradutta recommend it in time of fever as a good purgative with raisin. Charaka, Sushruta, and Bagbhatta use it for boils, pustules, leprosy and ringworm.

Externally.—

(1) The leaves are ground into a paste and applied to ringworm. The bark and leaves mixed and rubbed with oil are applied to pustules, ringworm, leprosy etc.

(2) The pulp is considered to be a good application for gout, rheumatism etc.

Internally.—(1) The pulp of the ripe pod mixed with tamarind pulp if taken at bed time, acts on the bowels mildly, causing one or two motions the following morning.

(2) The pulp should be used by dyspeptic persons.

(3) The pulp is an agreeable mild laxative, safe for children and pregnant women.

(4) The root-bark is also described as laxative, and useful in fever, heart diseases, retained excretions, biliousness etc.

(5) *Aroghadha'di* (अरोगधादि), the compound decoction which passes by this name is a very commonly used purgative. To prepare it, take of the pulp of *Cassia Fistula*, *Picrorrhiza kurroa* (*katurki*), chebulic myrobalans, long pepper root and the tubers of *cyperus rotundus* (*mustaka*) about sixty-four grains of each, and water thirty-two tola's ; boil down to eight tola's. Half of this quantity, or in strong constitutions the whole of it, is given for a dose.

(6) It is described as lenitive, useful for relieving thoracic obstructions, and heat of blood.

(7) It is largely used in smoking mixtures to flavour the tobacco used by the Indians, especially in Bengal.

CASSIA TORA.

= चाकुन्दे =

(*N. O. LEGUMINOSAE.*)

Vern. Sans :—Chakramarda. **Beng** :—Chakundia. **Hind** :—Chakaund, Panwar. **Guz** :—Kovaria. **Mar** :—Ta'kala, Tarota. **Tel** :—Tantepu-chettu, Tagarisha-chettu. **Tam** :—Ushit-tagarai, Tagarai.

Habitat.—Throughout India.

Parts Used.—Roots, seeds and leaves.

Collection and Storage :—The seeds must be collected during September and October when they become ripe. The

whole plant has a fetid smell. The leaves when full grown are mucilaginous, and have a nauseous taste.

Chemical Composition :—Both leaves and seeds contain a glucoside resembling chrysophanic acid. Mr. William Elborne of Owens College chemically investigated these seeds and came to the conclusion that their activity was due to "emodin," a substance closely allied to chrysophanic acid, in chemical characteristics. The leaves contain a principle similar to cathartin and a red colouring matter and mineral matters.

Physiological Action :—It has externally germicidal and antiparasitic action.

Therapeutics :—(1) Both leaves and seeds constitute a valuable remedy in skin diseases.

(2) It has an effective alterative in all kinds of skin diseases with induration as leprosy, cheloid, psoriasis, etc.

(3) With sour milk, the seeds are used externally in eczema.

(4) A paste of the root with lime juice is used for ring-worm and also for buboes in plague.

(5) The leaves are used as poultice to hasten suppuration.

(6) Chakradatta directs the seeds to be steeped in the juice of *Euphorbia nerii-folia*, and afterwards to be made into a paste with cow's urine as an application to cheloid tumours.

(7) The seeds are largely used with indigo. For this purpose they are regularly sold to the dyers.

(8) The seeds are roasted, ground to a powder, and used in place of coffee.

CEDRUS DEODARA

=देवदारु=

(A. O. CONIFERÆ.)

Vern. Sans.—Devada'ru. **Eng.**—Pinus Deodara. **Hind.**—Deodar. **Beng.**—Devadaru. **Tam.**—Devadaru-chedi. **Tel.**—Devadari chettu.

Habitat.—All over the Northern Himalayas.

Parts Used.—The bark and the oil.

Collection and Storage.—*Deodar* is easily grown in nurseries and with care successfully transplanted. Young plants suffer from waterlogging, and it is therefore best to transplant them from April to May. It prefers a light soil, granite or even limestone sub-soil. It is generally collected from Northern Himalayas where it largely grows, stored and sold in Indian Bazars.

Chemical Composition—The wood yields an oleo-resin known as Kelanka-tel and a tar resembling turpentine.

Physiological Action.—The wood is carminative, diaphoretic, diuretic.

Dose.—of the powdered bark, 10 to 40 grains ; of the oil, 10 to 40 minims.

Therapeutics.—

(1) Kelanka-tel and the turpentine are applied externally to ulcers and skin diseases.

(2) The tar is used as a favourite alterative and given in chronic skin diseases and in large doses, given in leprosy.

(3) It is chiefly used in combination with other medicines, as in the following diuretic mixture. Take of *devada'ru* wood, root of *Moringa pterygosperma* (*sigru*) and *Achyranthes aspera* (*apa'ma'rga*), one dram each and reduce it to paste with cow's urine. Given in ascities (Chakradutta.)

(4) In gonorrhoea, syphilis, gout and rheumatism, the decoction (Devdari kvatha) is given as a powerful alterative.

(5) The wood is ground to a paste with water and applied to the temples to relieve headache.

(6) The bark is useful in fever, flatulence, inflammation, dropsy, urinary diseases (as in gravels).

(7) Press Devadaru and ginger together. Take this with warm water. It is very good medicine in palpitation of the heart.

(8) The Arab Physician Avicenna said that it was called *sanubar-el-hindi* and that it was useful in rheumatism, paralysis etc.

CINNAMOMUM CAMPHORA.

==कपूर==

(N. O. LAURINEÆ.)

Vern —*Sans.*—Kapoora. *Beng.*—Ka'pu'r. *Hind.*—K'afur. *Mar. Guz.*—Ka'p'ur. *Eng.*—Camphor. *Fr.*—Camphre.

Habitat—Found in Indian Bazars, it is generally imported from China, Japan, Borneo and Sumatra.

Parts Used.—It occurs as *stearoptene* in translucent white crystals.

There are 2 varieties :—The sanskrit medical writers were familiar with the two qualities of camphor, *paḥva* (पक्व) and *apaḥva* (अपक्व). But the two qualities which are now in the bazars are (1) Japanese and Formosan (2) Bornean and Sumatran, known in India as *Bhimseni Kapur*.

Collection and Storage.—In the stem are formed coarse crystals which constitute the Barus or Bhimseni Camphor. The crystals are often found in concrete masses in the heart of the tree, or in the knots and swellings where the branches issue, but camphor is also found beneath the bark. To obtain the product, the tree is destroyed and cut into small splinters. An average tree is said to yield about 11 lbs., but the old trees are the most remunerative.

It should be stored in an air tight container, otherwise, it will volatilize.

Chemical Composition.—Camphor treated with chloride of lime and distilled is converted into *cymene* or *cymol*, a substance contained in many essential oils. When treated with nitric acid, it becomes oxidised and forms *Camphoric acid* which is a crystalline body, odourless and of an acid taste, soluble in alcohol, ether and fatty oils, in boiling water (1 in 10), and in cold water (1 in 100).

Physiological Action.—Diaphoretic, stimulant, antiseptic, antispasmodic, expectorant, sedative, temporary aphrodisiac, narcotic and externally anodyne.

Poisoning—Poisoning by camphor is by no means infrequent; even in small doses, the sensitiveness to its action varying considerably in different individuals, weak persons being especially vulnerable. While 30 grains (2 grams) will cause threatening phenomena in the strong, 6 or 7 grains will be sufficient to do so in a weak or old adult.

A sensation of heaviness about the head, developing into a violent headache and vertigo in some cases ; marked weakness and tendency to collapse, initiate the toxic phenomena. Nausea, vomiting are often observed. Delirium is a common symptom.

Pulse, full and strong at first, gradually weakens and becomes more rapid. Free sweating starts early and may continue throughout the advanced stage. The face flushed at first, becomes cyanosed ; these phenomena are attended with more or less dyspnoea and rapid or irregular and sometimes stertorous breathing. The pupils are moderately and equally dilated, but later the eyes may become ataxing, with loss of the conjunctival reflex.

The nervous phenomena are generally more marked. The delirium may be preceded or followed by hysterical excitement.

The period of excitement, is generally followed by unconsciousness, epileptiform convulsions, frothing of the mouth, biting of the tongue, involuntary urination and hence often ending in coma or death.

The urine is apt to be scanty or cloudy and may contain blood corpuscles.

No untoward effects usually follow recovery ; the exception being, temporary paralysis, meningeal congestion, tingling or numbness or soreness of legs and abdomen.

In case of poisoning the stomach should be emptied as soon as possible by means of an emetic or by washing out the organ with warm saline solution. Sugar has been recommended as an antidote in the hope that the harmless Gluco camphoric acid will be formed,

Dose :—*Camphor*, 2 to 10 grains. It should be given in the form of pills or in capsules.

Dose—*Aqua Camphoroe* $\frac{1}{2}$ to 2 fl. ounces. Contains 0·8 p.c. of camph.

Linimentum Camphoroe. For local use. camphor 20 parts and oil 80 parts.

Therapeutics :—*Externally*.—

(1) Camphor is locally rubefacient and resolvent.

(2) As an anodyne it allays pain.

(3) It is used as a wash for ulcers.

(4) It is used as a snuff in coryza.

(5) The liniment is useful for sprains, bruises, rheumatic pains of joints, in spasmodic pains of muscles.

(6) In tooth-ache, camphor dissolved in alcohol is applied to the cavities of carious teeth.

Chakradutta says that it is used in compositions of several collyria and is applied with the milky juice of *Ficus Bengalensis* to opacities on the cornea. He also recommends to cover the part, cut by weapons with ghee. Bhabaprak'ash says that it relieves the irritability of the bladder and frequent micturition. He also recommends it for ulcer of the ear with profuse discharge.

Internally :—

(1) In paroxysmial fits of asthma use the following pill every 2 or 3 hours. It will give you great relief. Also rub the chest with Lint. Camphor.

R/ Camphor—2 grs. }
Assafoetida—2 grs. } Mix for one pill.

(2) In chronic rheumatism, take the following pill at bed-time. R/ Camphor—2 grs. }
Opium— $\frac{1}{2}$ gr. } Mix

After a short time, pain will be relieved with diaphoresis.

(3) Camphor and Assafoetida together are very useful in heart disease.

(4) When infants are attacked with cough, wrap their chest with a warm thin piece of cloth smeared over with camphor. By this means, they will feel great relief.

(5) In spermatorrhoea, the following pill can be taken at bed-time ; it is very efficacious :—

R/ Camphor—2 grs
Ext. opium— $\frac{1}{4}$ gr.
mft. pill. j.

(6) In cholera, camphor is generally very effective and is used as spirit of camphor or camphor water.

(7) In neuralgic pain, use 1 or 2 grains of camphor with $\frac{1}{4}$ gr. Ext. Belladonna. It will give great relief.

(8) Karpura Rasa (कर्पूर रस) is used in diarrhoea. It consists of cinnabar, opium, camphor, tubers of *Cyperus Rotundus* (*mustaka*), indrajiva seeds and nutmeg in equal parts ; powder the ingredients and make into two-grain-pills with water. Each dose (that is 2 grains pill) will contain opium and camphor of each, $\frac{1}{3}$ gr.

(9) Camphor is used as a circulatory and respiratory stimulant in collapse, heart failure. The mode of administration is in the form of injection.

(a) Camphor in Oil—3 grs. in 1 c.c., 6 grs. in 2 c.c.

(b) Camphor in Ether—1 gr. in 1 c.c., 2 grs. in 1 c.c.

(c) Camphor in Oil with Ether—3 grs. in 1 c.c.

(10) In lobar pneumonia, broncho-pneumonia, infectious endocarditis etc, it is to be used in the form of above injections, twice daily or every 6 hours, according to the severity of the case.

Caution.

In pregnancy, one should not take camphor in high doses as, thereby abortion may take place.

CINNAMOMUM TAMALA.

=तेजपत्र=

(*N.O. LAURINEÆ*).

Vern. Sans.—Tejapatra. **Vern.**—Tejpat. **Hind.**—Taj.

Habitat.—Eastern portion of Himalaya mountains, Bengal, Assam, Burma.

Parts Used.—Leaves, bark and oil.

Collection and Storage.—The tejpat is plucked in dry and mild weather, from October to December, and in some places the collection is continued till the month of March. The leaves are collected once a year from young trees, and every other year from old and weak ones. In harvesting the tejpat, the small branches are cut down and the leaves are dried in the Sun for 3 or 4 days. They are to be stored in a dry-place.

Chemical Composition.—The leaves contain an essential oil, eugenol, terpene, and cinnamic aldehyde. The bark contains an oil similar to cinnamon oil.

Pharmacological Action.—Carminative, stimulant, diuretic, diaphoretic, deobstruent and lactagogue. The oil distilled from the leaves is a powerful stimulant.

Dose ;—Powdered leaves, 10 to 20 grains. Oil distilled from the leaves, $\frac{1}{2}$ to 2 minims.

Therapeutics.—(1) In Gonorrhoea, its bark and leaves are used as decoction or injection.

(2) The leaves are used topically in rheumatism.

(3) The powder of its leaves is used internally in diarrhoea and dysentery.

(4) Hakims use the powder of its leaves in colic, enlargement of spleen, fevers and flatulence.

(5) Headache is relieved by rubbing its oil over the forehead.

(6) The linctus made of its leaves, honey and peepul rubbed up, is very useful in cough, cold and asthma.

(7) "Given as decoction or powder, in suppression of lochia after child birth, with much benefit." (Dr. Ratton, in Watt's Dict.)

CINNAMOMUM ZEYLANICUM.

=दारुचिनि=

(*N.O. LAURINEÆ*)

Vern. Sans.—Gudatvak. *Hind.*—Darchini. *Beng., Mar., Guz.*—Dalchini. *Tam., Tel., Mal.*—Lavanga-pattai. *Eng.*—Cinnamon. *Fr.*—Cannelle-de-Chine.

Habitat.—Indigenous in Ceylon, Southern India and China.

Parts Used.—The bark and essential oil.

Collection and Storage.—The Bark is to be kept in dry place and the oil in air-tight vessel leaving no air space.

Chemical Composition.—Contains a volatile oil (oleum cinnamomi), tannic acid, mucilage, colouring matter, an acid and lignin. The oil made from bark differs in chemical composition as well as physical characteristics from oil distilled from leaves. The leaf oil is practically free from cinnamic aldehyde and contains a large per centage of Eugenol.

Physiological Action.—Aromatic, stimulant, astringent and haemostatic. It is also said to have anti-septic properties. Very large doses are soporific and cause death by failure of respiration.

Dose—of oil, $\frac{1}{2}$ to 3ms ; of powder 10 to 20 grains.

Therapeutics.—

(1) It is commonly used as adjuvant to, or to disguise the flavor of, less agreeable drugs.

(2) The Spice-plaster may be used as a counter-irritant in colic, neuralgia and croup. The paste is directly applied to the part.

(3) It may be used as a stomachic in flatulence, but is usually combined with other remedies.

(4) Relief may sometimes be obtained in acute dysentery by giving the powder in 10 to 20 grain doses, twice a day.

(5) The oil is used in influenza and catarrh, in 1 to 3 minim dose on sugar and as an inhalation (30 to 40 minims in a pint of boiling water)

(6) Useful as intestinal disinfectant in Typhoid and similar conditions.

CISSAMPELOS PAREIRA:

=आकनादि=

(N.O. MENISPERMACEÆ)

Vern. Sans.—Ambashtha', Pa'tha'. **Beng.**—A'kana'di. **Hind.**—Ha'rjori. **Mar.**—Paha'rmul. **Tel.**—Pa'ta. **Guz.**—Karandhis. **Tam.**—Ponmutootai.

Habitat.—Tropical and sub-tropical India.

Parts Used.—The root and leaves.

Collection and Storage—To be kept in a dry place.

Chemical Composition.—*Pilosine* or *Cissampeline* identical with berberine, exists in the roots to the extent of $\frac{1}{2}\%$ and a little tannin.

Physiological Action.—It is a bitter tonic and diuretic, exercising an astringent and sedative action on the mucous membranes of the intestinal as well as genito-urinary organs. It can be used as a substitute of Pareira (B.P. 1898) (*Chondradendron tomentosum*) and for Buchu.

Dose.—Root-powder, 20 to 40 grains. Liquid extract, (1 in 1) $\frac{1}{2}$ to 2 drams. The decoction of roots (1 in 20) 2 to 4 ounces.

Therapeutics.—(1) Its root is used in fever and diarrhoea. In inflammatory affections of the bladder and kidney, the drug is very useful. It is antilithic.

(2) *Chakradatta* recommends it in fever and diarrhoea and in internal inflammation. It is very useful in acute and chronic cystitis and catarrhal affections of the bladder.

(3) The pain due to piles is relieved by taking the decoction of its root with the powder of Hedysarum Alhagi (दुरालभा), dried Aëgle marmelos (बेल) and Ajwan.

(4) In diarrhoea caused by indigestion and attended with pain and slimy or bilious stools, the following decoction is used. Take of pa'tha' root, indrajaya, chebulic myrobalan and ginger, each half a tola', water thirty-two tola's. Boil down to one-fourth.

(5) *Dr. W. Wright* observes that the roots are black and as thick as those of sarsaparilla, agreeably aromatic and bitter and have been ordered in nephritic disorders, in ulcers of the kidneys and bladder and in some species of jaundice.

CITRULLUS COLOCYNTHIS.

= इन्द्रवारुणी =

(N.O. CUCURBITACEÆ.)

Vern. Sans.—Indrava'runi. *Hind, Beng.*—Indra'yan, Makal. *Guz.*—Indra'yan. *Tam.*—Tumatti. *Tel*—Chittipa'para. *Eng.*—Bitter apple. *Fr.*—Coloquinte.

Habitat.—Indian colocynth is common on the lower slopes of the Western Himalaya and also on the plains of the drier parts of India. It is procurable in the bazars of the North-West Provinces under the name of *indrāyan*.

Parts Used.—The root and the fruit.

Collection and Storage.—The fresh fruits are cut into pieces and dried in the Sun and afterwards stored in a dry place.

Chemical Composition.—

The fruit contains an alkaloid soluble in chloroform and in water (but not in ether), and is precipitated from its solution in acids by Meyer's reagent. The percentage of the active principle "*colocynthine*" is about 0.29 % in the specimen examined by us ; it also contains some resins and gummy matter.

Physiological Action.—The pulp of the fruit is described as bitter, acrid, cathartic and drastic purgatives. The root of the plant is also cathartic.

In small doses, colocynth acts as a simple *bitter*, increasing the gastric and intestinal secretions and improving the appetite. In large doses, it augments the flow of bile and succus entericus considerably, stimulates the muscular coat, causes a little griping, and leads to the evacuation of a *watery motion*. In still larger doses, the hypersecretion is excessive and the griping is severe because the muscular coat is powerfully irritated, and several abundant watery motions result. The drug may therefore be called *drastic*, *hydragogue*, and *cathartic*. The depression produced may be considerable.

Doses.—Powder, 2 to 8 grains. Ext., $\frac{1}{4}$ to 2 grains.

Therapeutics.—(1) A snuff of the powdered root is irritating to the eyes and nostrils.

(2) A paste of the fruit or the root with that of *nux vomica* is applied to boils and pimples to hasten maturation.

(3) A poultice of the root is said to be useful in inflammation of the breasts and snake-bite.

Internally :—

(1) It is an excellent purgative to relieve *portal engorgement*. It should always be given with *hyoscyamus* to prevent griping.

(2) Because of the watery character of the stools, it may sometimes be given in *ascites, dropsy or cerebral congestion*.

(3) In very minute doses, it is beneficial in colic, sciatica, ovarian and other neuralgias.

(4) The root is given in rheumatism and enlargements of the abdominal viscera in children.

CROTON TIGLIUM

= जयपाल =

(*N.O.*—EUPHORBIACEÆ.)

Vern. *Sans.*—Jayapa'la, *Beng.*—Jaypal. *Hind.*—Jamalgota. *Guz.*—Nipalo. *Mar.*—Jamalgota. *Can., Tel.*—Nepala. *Tam.*—Nervalam. *Mal.*—Nirvalam. *Burm.*—Kaṇako. *Eng.*—Purging croton. *Fr.*—Croton cathartique.

Habitat.—greater part of India.—Eastern Bengal Assam and elsewhere.

Parts Used.—Seeds and oil.

Collection and Storage.—To be kept in a dry-place.

Purification.—The seeds are boiled in milk and their outer skin and embryo are removed before being used internally.

Great care is to be taken in the purification of the seeds, by removing the foliaceous cotyledons with short thick radicle (विषपत्र) and afterwards, boiling, the split seeds in milk.

This is still further mitigated, by pressing the pounded milk-boiled seeds, within folds of blotting paper, in a letter copy-press which removes a large portion of the oil and makes the kernel a milder medicine.

Chemical Composition.—The following is the report of analysis of the croton seeds done in our laboratory.

1. The crude seeds contain a fixed oil to the extent of 48%. This oil contains an optically active resin in solution. Its specific rotation is observed to be 6° to the right.

2. The seeds after purification by boiling with milk are found to contain the fixed oil to the extent of 16% only. This oil contains less of resins—the specific rotation being only 1° to the right.

Physiological Action—The seed is a powerful drastic purgative and vermifuge ; in over-doses, it is an acro-narcotic poison. The Oil is a powerful hydragogue cathartic and externally, vesicant. The activity of croton oil is attributed to the presence of croton oleic acid which is said to occur in the free state (which is freely soluble in alcohol) and in combination as a glyceride. The glyceride does not possess poisonous properties ; but the free acid acts as a powerful irritant to the skin and as a purgative. The crotonal glyceride is attacked and split up like other glycerides by the ferments of the juices of the stomach and the croton oleic acid is set free, which then exercises its purgative action.

Dose.—Oil, $\frac{1}{2}$ to 1 minim ; of Powdered seed after purification—about 2 grains.

Internally. The following Ayurvedic preparations are greatly used.

(1) Ichchhavedi Rasa (इच्छाभेदी रस) Take of mercury, sulphur, borax, and black pepper, one part each, ginger three parts, croton seeds (purified) nine parts ; rub them together with water and make into two-grain-pills. These are given in fever with constipation as also in ascites and anasarca. (Rasendra Sarasangraha¹)

(2) Naracha Rasa (नाराच रस) Take of mercury, borax and black pepper one part each, sulphur, ginger and long pepper two parts each ; seeds nine parts ; powder the ingredients and make into pills with water. These are given in tympanites and ascites.

CYNODON DACTYLON,

=दुर्वा=

(*N. O. GRAMINEAE.*)

Vern. Sans.—Durba'. *Beng.*—Durba. *Hind.*—Dub. *Mar.*—Durva, Harala. *Eng.*—Creeping Dog's-tooth-grass.

Habitat.—Grows everywhere, throughout India.

Parts Used.—The herb and the root-stalk.

Collection and Storage.—always obtained fresh.

Chemical Composition.—Watery extract of powdered grass reduces Fehling's solution, the glucose equivalent being about 1%. This is due to presence of carbohydrate, probably a Pentose body.

Physiological Action.—The fresh juice is demulcent, astringent and diuretic. The plant is acid and haemostatic.

Doses.—of *fresh juice*, 1 to 2 ounces. *Powdered grass*, 20 to 40 grains. *Decoction*. 2 to 4 ounces.

Therapeutics.—*Externally*,

(1) The fresh juice is used as a snuff in epistaxis.

(2) The bruised grass stops bleeding when it is applied to cuts and wounds.

(3) It is a good medicine for skin diseases.

Internally—The decoction is useful in dysuria and is to be taken with honey and sugar.

CYPERUS ROTUNDUS

=मुथा=

(*N. O. CYPERACEAE.*)

Vern. Sans.—Mustaka. *Beng.*—Mutha' *Tam.*—Korai. *Hind.*, *Guz.*—Motha. *Tel.*—Bhadra-muste, Tunga-muste. *Mar.*—Bimbal, Barik-motha.

Habitat.—Grows plentifully in moist soil.

Parts Used.—Bulbous root.

Collection and Storage.—It can be collected, all the time during the year ; should be well dried and kept in air-tight vessel.

Chemical Composition.—The swellings of the roots being carefully separated from other parts and pulverised and examined

for alkaloidal principle with a mixture of ether and chloroform and are found to contain about 0.3% of a principle which is precipitated from its acid solution with Meyer's reagent.

Alcohol dissolves the total amount of alkaloids together with a lot of resins and a volatile odorous principle. The alkaloid is more soluble in alcohol, chloroform and less so in ether.

[The sample of *Cyperus Pertenuis* (नागर मुथा) was also examined by us and found to contain the same active principle.]

Physiological Action.—Astringent, stomachic, diaphoretic, diuretic, demulcent, galactagogue and intestinal sedative. The alkaloid slows the intestinal peristaltic movements and dilates intestinal vessels.

Dose.—of the Powder, 20 to 40 grains ; of Decoction, 1 to 2 chattacks.

Therapeutics.—*Externally*, (1) As a galactagogue, the fresh tubers are applied to the breasts as paste.

(2) If a plaster of *mutha* (big variety) with cow's ghee be applied to a wound (caused by weapons) and allowed to remain covered with a piece of clean cloth, for some days, the wound will heal up rapidly.

Internally—(1) If a decoction of *Mutha* with *Kshetpapa* is taken in dysentery, pain in the abdomen is relieved by it. (Charaka). [*Mutha* one tola, *Kshetpapa* one anna by weight.]

(2) Boil *Mutha* (2 tolas) in half a seer of water to its quarter. Administer it in chronic dysentery with a little honey, in the morning for 4 or 5 days.

(3) *Shadanga paniya* (षडङ्ग पानीय) Take of the tubers of *Cyperus rotundus*, red sandal wood, root of *Andropogon muricatus* (usira), *Oldenlandia herbacea* (parpata), *pavonia odorata* (ba'la') and dry ginger, each one drachm, water two seers ; boil down to one seer. This decoction is given as a drink for appeasing thirst and relieving heat of the body in fever.

DATURA FASTUOSA.

= धुतुरा =

(N.O.—SOLANACEÆ.)

Vern. Sans.—Dhustura. **Eng.**—Thorned apple, *Beng.*—Dhutura. *Hind.*—Dhatura. *Guz.*—Dhaturo. *Tam.*—Umathai. *Tel.*—Ummetta. *Fr.*—Herbe aux sorciers.

Habitat.—Throughout India.

Parts Used.—The roots, leaves and seeds.

Collection and Storage :—Fruit should be gathered and dried just before dehiscence for collection of the seed.

Chemical Composition.—The Leaves contain an alkaloid daturine, mucilage, albumen and ash 17 p.c. which contains potassium nitrate 25 p.c. The Seeds contain daturine, resin, mucilage, proteids, malic acid, scopolamine and ash 3 p.c. The alkaloid in the seeds of *Datura Stramonium* which was up till recently known as Daturine has now been found to be a mixture in varying proportions of atropine and hyoscyamine. According to Lyon's researches it would seem that the alkaloidal strength of the seeds and leaves is much the same and should this fact be established as the result of further work upon this subject, we should recommend that this tincture like those of henbane and belladonna be prepared from the leaves, as the latter is a more elegant pharmaceutical product than that of the seeds. This tincture like those of henbane and belladonna readily admits of standardisation.

Physiological Action.—*Datura* when taken either in small or large doses produces symptoms which are precisely similar to those caused by belladonna. Like belladonna, *datura* chiefly depends for its therapeutic powers upon firstly, its sedative action upon the peripheral nerves. Secondly, its stimulating action upon the respiratory centres and thirdly, its influence upon the heart and vasomotor centres. By virtue of its first mentioned power it is useful in spasmodic diseases such as whooping cough, dysmenorrhoea and local spasm. As atropine has some influence upon afferent nerves it has some power of relieving pain, but for this action to be marked, direct application is necessary. On account

of the paralyzing influence which it has on the inhibitory intestinal nerves the extract may be used as an adjunct to more decided laxatives.

As the alkaloid is eliminated by the kidneys it produces increased diuresis but in cases of poisoning there is retention of urine from paralysis of bladder.

As it also contains a large amount of hyoscyamine it is therefore used to relieve pain and procure sleep or quieten irregular nervous action and is not supposed to exercise any specific curative influence over particular diseases.

Dose.—*Powder of the seeds*, 2 grs ; *powder of the root*, 20 to 40 grains.

Therapeutics.—*Dr. Waring* notes that the tincture was employed in hospital practice in India and it was found to produce all the sedative and narcotic effects produced by opium. So it is an useful and cheap substitute for opium, 20 drops of tincture being equal to 1 grain of opium.

This drug is highly spoken of in the treatment of insanity and also of painful headache which often precedes epilepsy and mania. It procures sleep in cases of acute mania. It is very useful in cases of neuralgia and rheumatic affections, dysmenorrhoea, syphilitic pains, cancerous sores and spasmodic asthma.

Dr. Waring mentions of a case of sciatica which obtained great relief from $\frac{1}{8}$ th grain to 1 grain extract.

The active principle daturine has been proposed in place of atropine and used for ophthalmic purposes as *Guttae Daturinae* $\frac{1}{100}$ th grain with gelatine in London Royal Ophthalmic Hospital.

The effect of the administration of datura is to dilate the pupils ; should it become very dilated, this fact may be taken as a sign that the medicine has been carried as far as it can be with safety, whether it has produced its other effects or not (*Waring's Bazar Medicines of India*).

Waring recommends it to be used in traumatic tetanus when better remedies are not procurable.

The plaster made from extract of the seeds and poultice of the leaves are effectual local anodynes in cases of nodes and

rheumatic enlargement of joints, painful tumours or external piles. The plaster is frequently used on the chest in asthma and other pulmonary affections but neither should be applied to ulcerated surfaces owing to the risk of absorption of the poison. . . .

The dried leaves are smoked to relieve the urgent symptoms of spasmodic asthma, dyspnoea of phthisis, emphysema of the lungs and even in chronic catarrh.

The dried root and the lower part of the stem might as well be smoked with leaves (to prepare the roots for use, they are quickly dried, cut into pieces and beaten so as to loosen the texture): The smoke produces a sense of heat in the lungs followed by copious expectoration and attended frequently with temporary vertigo or drowsiness and sometimes with nausea. Dangerous and even fatal consequences have resulted from its incautious or improper uses.

This is used externally as an ointment, with great advantage in irritable and painful hæmorrhoids.

The seeds are employed by hakims in impotence. Seeds of 15 fruits dried and powdered, are well boiled in 10 seers of cow's milk ; out of this milk as much ghee is made as possible ; this ghee is believed to contain strong aphrodisiac properties and is rubbed on the genitals twice a day to stimulate them and 4 grains of the ghee is given internally once a day.

Svalpajvarankusa Rasa (स्वल्पज्वराकुशो रस) :—Take of mercury, sulphur, aconite, ginger, borax, harital, and *dhatūra* seeds equal part ; rub them together with the juice of *Bhringaraj* and make into two grain pills. These pills are used in fever attended with diarrhoea, loss of appetite.

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EMBELIA RIBES,

= विडङ्ग =

(N.O.—MYRSINÆE)

Vern. Sans.—Vidanga. Beng.—Biranga. Hind.—Viranga. Mer.—Vavadinga. Guz.—Va'yvirang.

Habitat.—Throughout India.

Parts Used.—The dried ripe fruit.

Collection and Storage.—The berry should be freshly dried and be of red colour ; it darkens afterwards.

Chemical Composition.—Active principle is “Embelic Acid.”

Physiological Action.—*Susruta* describes the seeds as an anthelmintic, alterative and tonic and recommends their use along with liquorice root for the purpose of strengthening the body and preventing the effects of age. Later writers regard Baberang as carminative, stomachic and anthelmintic and useful in intestinal worms, dyspepsia and skin diseases. The berries enter into composition of several applications for ringworm and other skin diseases. It is also a very valuable anthelmintic against tapeworms.

Dose in powder.—1 to 4 drams.

Therapeutics. *Dr. Harris* in the empty stomach recommends 1 to 4 drams of pounded seeds with milk or curds to be taken early in the morning followed by a dose of castor oil ; the worm is expelled dead. It can be repeated every morning, if necessary ; no ill effects follow its use. A teaspoonful of the powder might be given to children in case of tapeworms, twice a day. The taste is rather pleasant, slightly astringent and faintly aromatic.

It is a common practice to put a few berries of the plant in the milk and give to young children in order to prevent flatulence.

Embelic Acid. $C_9 H_{14} O_2$ —insoluble in water and is not decomposed when boiled with dilute sulphuric or hydrochloric acid ; salts of embelic acid, with soda, potash and ammonia have been prepared. The ammonium salt is most readily obtained in large needle-shaped crystals of a foxy red hue. This ammonium salt is an effective anthelmintic against taenia, in doses of 3 grains for children and 6 grains for adults. It would act in cases in which ordinary taeniocides fail. The best method is to give it with honey or simple syrup, the drug being preceded and followed by castor oil. This is tasteless and so has a decided advantage over male fern and is an useful addition to the *Materia Medica*.

EPHEDRA VULGARIS

=सोमकल्पलता =

(*N.O. GNETACEÆ*)

Vern. Punj.—Amsa'nia, Butshur, Cheva. *Kunawar.*—Khanda, Khama. *Sullej.*—Phok. *Japan.*—Ma-oh. *Beng*—Soma kalpalata.

Habitat.—It grows in abundance in the dry, stony regions of temperate and Alpine Himalayas, extending from western Tibet to Sikim. On the Shalai Hills, North of Simla, it occurs in large quantities.

Parts Used.—Leaves.

History of the Drug.—The dried branches are used in Parsi ceremonials and is brought from Persia to India. The plant was used by the ancient Aryans and is probably the same as the Soma of the Vedas. (*Pharmacographia Indica*—Dymock, Warden & Hooper).

There is no Sanskrit or Vernacular name of this drug—and the plant as described by Charaka and other Sanskrit writers as Somalata cannot be identified ; hence we take the privilege to style this *Ephedra Vulgaris*, as Soma-kalpa-lata' in our vernacular.

Besides *Ephedra Vulgaris*, two other varieties (as *Ephedra Intermedia* and *Ephedra Peduncularis*), are known to grow in India, but as the alkaloidal contents and mode of action, are nearly similar, we include them under *Ephedra Vulgaris*.

Collection and Storage.—From the study of seasonal variations, it is found that during autumn before the winter-frost sets in, the alkaloidal yield is maximum. It should be kept in dry place, otherwise it will deteriorate.

Chemical Composition.—In the Calcutta School of Tropical Medicine, six samples of *E. Vulgaris* were collected from May to December, and were analysed. The table on the next page gives the results of the alkaloidal contents of different specimens. (*J. M. R.* Jan. 1930 Vol XVII.)

Time of collection.	Total alkaloidal content, p. c.	Ephedrine.	Pseudo-ephedrine By diff.
May 1928	0.96	0.61 (64 p. c.)	0.35
June 1928	0.979	... ..	... ..
August 1928	0.776	0.428 (55 p. c.)	0.348
October 1928	1.17	0.807	0.363
December 1928	1.002	... ..	... ..

The alkaloids gradually increase in the summer months, but appear to fall somewhat in the rainy season. The maximum is attained in the autumn (October) and then there is decline.

Yield of total alkaloid from *E. Vulgaris* is 0.92 %

Percentage of Ephedrine 71.25

Percentage of Pseudo ephedrine 28.75

Green twigs show a very much higher alkaloid content than the stem.

Physiological and Chemical Reactions of Indian alkaloids are identical with that obtained from Chinese Ephedra.

Ephedrine was isolated from the Chinese plant *Ma-huang* by Dr. N. Nagai of Tokio, Japan (1887) and its pharmacological action was at first studied by Amatsu and Kubota in 1917, and by Drs Cheu, Read and others in 1925. Since then considerable experimental work has been done on the action of the Chinese and European varieties of ephedra, by various workers.

The Indian varieties were studied by Lt. Col. R. N. Chopra of the Tropical School of Medicine for the first time (in 1928), who found that the physiological and chemical reactions of the Indian alkaloid, are identical with the alkaloid obtained from other varieties. The action of Ephedrine and Pseudo-ephedrine from the Indian varieties of Ephedra, on the tissues of the body as elicited by Lt. Col. Chopra and his co-workers is briefly summarised below :—

Action on the Circulation—Pressor effect after intravenous injections is due to vaso-constriction produced by the stimulation of the sympathetic nerve-endings and ganglion cells. Though the drug acts by stimulation of the sympathetic, stimulation of the

Heart is not apparent. This is due to the fact that the drug acts simultaneously on the inhibitory mechanism of the heart. Thus the effect of Ephedrine on heart depends upon the sum total of its action on the sympathetic, the vagus and myocardium.

Big doses depress the myocardium.

Action on the Gastro-Intestinal Tract—Movements are markedly increased. It passes through the Liver unchanged.

It is very quickly absorbed from the gastro-intestinal tract.

Action on the Respiratory System.—It dilates the bronchioles but has no action on the centre.

Action on the Genito-Urinary System—Shows slight relaxation, but pregnant uterus does not show any change.

Action on the Pupils—4% solution produces marked dilatation of the pupils within 25 minutes which lasts for several hours.

Muscles under the effect of the alkaloid are much more readily fatigued.

Pseudo-Ephedrine—Actions closely resemble those of Ephedrine, the difference being only one of degree. Its toxicity is much lower. There is no unpleasant side effects which are common with Ephedrine. It is a better diuretic and better drug for the relief of attacks of asthma.

Unpleasant side effects with Ephedrine are : Acute pain in the cardiac region and feeling of distress in the præcardium ; there are palpitation, flushing of the skin, tingling and numbness of extremities. In patients with organic disease of the heart, it may produce decompensation. It is liable to produce constipation and loss of appetite. Patients very often complain of insomnia after the use of the alkaloids.

As Ephedrine Hydrochlor, has been introduced in practice for cases of Asthma or Bronchial troubles, most of the unpleasant effects, were observed among patients and we were in a fix whether to continue prescribing this remedy Ephedrine Hydrochlor or not.

When Lt. Col. Chopra's researches on the action of Pseudo-Ephedrine were published, (I.M.G. Jan 1929) we came to know that the drug has another alkaloid, which is milder, but still quite active. The isolation and separation of Ephedrine and Pseudo-ephedrine is a tedious and expensive process and medicines, so manufactured will be costly and not within the reach of suffering millions. I therefore began using the whole drug in powder form among my patients, with very encouraging results and the researches on whole drug is given on the next page.

Action of E. Vulgaris (whole drug)

In order to test the effect of total extractives from this drug, watery extract of 1 in 1 was prepared and on assaying it was found to contain 0.7% of alkaloid. Without the addition of any preservative, this liquid extract was found to keep well in the laboratory for days together.

Its action on the Blood Pressure—0.14 mgrm does not affect the blood pressure, 0.28 mgrm per bodyweight of cat (Graph 1) raised the blood pressure by 15 m.m. of mercury and maintained that rise for a considerable period of time ; afterwards, repeated injections failed to raise the blood pressure further.

Its action on the Respiration—0.14 mgrm (Graph 1) per kilo body weight in cat, dilated the bronchioles ; 0.28 mgrm per kilo (Graph 2) stopped the respiration for a few seconds and 0.50 mgrm per kilo (Graph 3) completely stopped the respiration for over 5 minutes.

As has been pointed out before, Pseudo-ephedrine is a better drug for relaxing the bronchial muscles. The liquid extract seems to be a far better drug for dilating the bronchioles than ephedrine or pseudo-ephedrine alone. And this is due to the fact that its liq. ext. contains both ephedrine and pseudo-ephedrine.

The main use of Ephedrine is to relieve bronchial spasms and in cases like asthma, it has got to be repeated for a long period. But continued use of Ephedrine is accompanied by unpleasant side effects, as enumerated before. These are mostly due to vaso-constriction produced by the drug.

But, in the liquid extract of Ephedra Vulgaris, containing both the alkaloids Ephedrine and Pseudo ephedrine, the dose which produces relaxation of the bronchial muscles, does not affect the blood pressure or affects it but very slightly.

Thus in this preparation (Liq. Ext. of Ephedra) we have got a drug which is easier to prepare than the pure alkaloids and which can be safely continued for a long period, without fear of producing any unpleasant symptoms in the patient. And above all, the combined action of the alkaloids is much better than an alkaloid used separately.

Summary : (Liq. Ext.)

(i) Watery extract of *E. Vulgaris* 1 in 1, can be prepared to contain 0·4 to 0·7% of total alkaloids, according to the active principle contained in the drug. .

(ii) It keeps well for a long time without any preservative.

(iii) Pharmacological actions of liq. ext. are the same as those of the isolated alkaloids.

(iv) The dose which relaxes the bronchial muscles does not affect the blood pressure.

(v) For relieving bronchial spasms, it seems to be a far better drug than either of the alkaloids.

(vi) For the treatment of cases like Asthma, it can be continued over a long period without producing any toxic symptom.

Dose.—Powder,—10 to 15 grains. Liq. Extract (1 in 1),— $\frac{1}{2}$ to one dram.

Therapeutics.—The Powder is being used with considerable success, in cases of bronchial asthma which become worse at night. A dose of 10 to 15 grains, is sufficient to give relief to the patient and produce good refreshing sleep. Dr. Biektune used the decoction of the drug in cases of muscular and articular rheumatism ; the pain is relieved, pulse slowed and made softer and respiration less hurried. Within a few days, the temperature drops to normal, swelling of the joint diminishes and the patient is cured ; the drug also improves the digestion and promotes the action of the bowels.

The writer also used the powder in cases of rheumatic troubles with marked improvement.

As the drug relieves bronchial spasms, good results are obtained in cases of Whooping Cough either alone or in combination with other drugs, e.g. Heroine Hydrochlor and other sedative remedies.

FERONIA ELEPHANTUM.

= कपित्थ =

(*N. O.* RUTACEÆ).

Vern. Sans.—Kapittha. *Beng.*—Kathbel. *Hind., Mar.*—Kowit, Kavitha. *Tam.*—Nila-vilam. *Guz.*—Kotha. *Can.*—Byalada. *Tel.*—Nela-velaga. *Eng.*—Wood apple. *Fr.*—Pommier d'e'le'phant.

Habitat.—Throughout India.

Parts Used.—The fruit, leaves and gum.

Collection and Storage.—The gum is found in some bazars of Madras ; The ripe fruit is sold abundantly in all the towns and villages of India ; and the leaves can be easily gathered whenever they are needed, the plant being pretty common all over the country.

Chemical Composition.—The pulp contains a large quantity of citric acid with potash, lime and iron. The leaves yield an essential oil similar to that obtained from bael leaves.

Physiological Action.—The gum is demulcent and emollient ; the ripe fruit stomachic and refrigerant ; and the leaves carminative and stomachic.

The unripe fruit is astringent.

The gum is used as substitute for Gum Arabic and Tragacanth imported from Europe, the syrup for drink, and the leaves as carminative like dill and anise.

Dose :—Of the **mucilage**, from two to four fluid ounces, (prepared in the same manner as the mucilage of the Indian Gum Arabic) ; of the **syrup**, from four fluid drachms to one fluid ounce ; (Take of the pulp of the ripe fruit, ten ounces ; mix well in thirty ounces of water and strain through cloth ; add twenty ounces of refined sugar to the strained liquid, and apply heat, till the sugar is dissolved and the liquid assumes the consistence of a thick syrup ; and of the **infusion**, from two to

four fluid ounces, three or four times in the twenty-four hours. (Take of the fresh leaves, three ounces ; boiling water, one pint ; infuse in a closed vessel for two hours and strain).

Therapeutics.—Externally.—

(1) The country people pound the leaves with curds and apply the mixture to the whole body as a remedy for heat of blood, supposed to be caused by bile.

(2) The pulp applied externally is a remedy for the bites of venomous insects ; if not obtainable, the powdered rind may be used.

Internally.—

(1) The ripe fruit is used with advantage in dyspepsia and in quenching thirst in febrile conditions.

(2) The ripe fruit is said to be useful in hiccough and affections of the throat.

(3) The syrup is used in salivation, sore-throat and in strengthening the gums.

(4) Sherbet made from the fruit increases the appetite.

(5) The unripe fruit is used in combination with *bael* and other medicines in diarrhoea and dysentery.

(6) The leaves are administered with benefit in some slight cases of dyspepsia.

(7) The gum is used as a demulcent in bowel affections.

(8) *Kapitthashtaka Churna*.—(कपित्थाष्टक चूर्ण) Take of the pulp of unripe wood-apples eight parts, sugar six parts, pomegranate juice, tamarind pulp, *bael* fruit, flowers of *Woodfordia floribunda* (*dhataki*), ajmad, and long pepper, each three parts, black pepper, cumin seeds, coriander, long pepper root, root of *Pavonia odorata* (*bala*), sonchal salt, ajowan, cardamom, cinnamon, *Tejapatra*, flowers of *Mesua ferrea* (*nagakesara*), ginger and plumbago root, each one part, powder the ingredients finely and mix. Dose, about one drachm. This preparation is used in chronic diarrhoea and dysentery with loss of appetite and in affections of the throat.

FERULA FOETIDA.

= हिङ्गु =

(*N. O. UMBELLIFERÆ*).

Vern. Sans.—Hingu. *Beng., Hind.*—Hing. *Guz.*—Hingra
Tam.—Kayam, Perungayam. *Tel.*—Inguva. *Eng.*—Asafoetida.

Habitat.—Punjab, Kashmir, Persia and Afghanistan.

Parts Used.—The gum-resin.

Collection and Storage.—As a commercial product, several varieties of Hing can be seen ready for sale : Kandahari Hing (European commercial Hing), Indian Hing and the Stony Asafoetida. Among these, Indian Asafoetida is the best. Indian Asafoetida is collected in spring. In all stages of its growth, every part of this plant exudes upon abrasion a milky juice which becomes hard on drying.

Chemical Composition.—The principal constituent of the drug, and that to which its odour is due, is a volatile oil, consisting in part of hexenyl sulphide, hexenyl disulphide, pinene, and cadinene : it also contains 60 p. c. of a resin ; a gum ; ferulaic, malic, acetic, formic, and valerianic acid.

Physiological Action.—Asafoetida is a stimulant to the brain and nervous system, a powerful antispasmodic, a gastric stimulant and carminative (imparting a sense of warmth to the stomach), a laxative, diuretic, diaphoretic, emmenagogue, and aphrodisiac. It is also a stimulating expectorant. Large doses cause vomiting and purging, nervous phenomena, and burning urination. The drug or its volatile oil is eliminated by the urine, sweat and breath. Hing should be fried before being used as medicine, as raw or unfried Asafoetida is said to cause vomiting.

Purification.—As the Hing we get from bazar, is generally mixed with many impurities it is first made into an emulsion with water. After that, it is strained, through a piece of clean cloth in a clear pot. The strained emulsion is then concentrated and fried in ghee. Thus the purification is obtained.

Dose.—*Emulsion asafœtida*, containing 4 per cent of the drug. Dose— $\frac{1}{2}$ to 1 ounce. *Pilula asafœtida* (pills of asafœtida) each pill containing 3 grains of asafœtida. Dose—2 to 4 pills. *Tincture asafœtida*, containing 20 p. c. of asafœtida. Dose— $\frac{1}{2}$ to 1 dram. *Suppositories of asafœtida*.—Containing the equivalent of 40 drops of the tincture. *Plaster of asafœtida*.—Useful as an antispasmodic and mild counter-irritant.

Therapeutics.—*Internally.*—

(1) The drug is serviceable in flatulence, especially in old people and children.

(2) In *Infantile convulsions* it is highly useful, given by rectal injection.

(3) In the *tympanites of typhoid fever* asafœtida is an effective remedy, given by enema.

(4) As a stomachic tonic it is used in *dyspepsia* with flatulent colic

(5) As an expectorant, it is used in *chronic bronchitis*.

(6) In *whooping-cough*, it acts both as an expectorant and antispasmodic.

(7) An enema of asafœtida with castor oil and turpentine is very beneficial in intestinal colic and worms.

(8) *Hingvashtaḥa churṇa*—(हिङ्गुष्टक चूर्ण) Take of fried asafœtida, ginger, long pepper, black pepper, *ājowan*, cumin seeds, nigella seeds and rock salt, equal parts ; reduce them to powder and mix. Dose, ten to twenty grains, to be taken with the first morsel of rice and clarified butter taken at breakfast. Thus administered, it is said to increase the appetite and digestive powers and to cure flatulence.

(9) A bit of warm asafœtida externally placed in the cavity of a carious tooth is said to relieve pain.

FICUS GLOMERATA

= यज्ञदुमुर =

(*N. O.*—URTICACEAE).

Verns. *Sans.*—Udumbara. *Beng.*—Yagnadumar. *Hind.*—Gular. *Tam.*—Atti. *Tel.*—Moydi, Atti. *Guz.*—Umbro.

Habitat.—All parts of India.

Parts Used.—The root, leaves, fruit.

Collection and Storage.—Fresh parts are mostly used ; the dried portions are to be kept in a dry place.

Chemical Composition—Small twigs & leaves—The result of the analysis done in our laboratory, yielded 6.25% extractive matter with water from fresh leaves. The extract mainly consists of tannin and resins. It is slightly alkaline to litmus.

Physiological Action.—Astringent, haemostatic, carminative, stomachic.

Dose.—Ext. of leaves, grs. 10 to 20 ;

Therapeutics. 1. **The root**—The root-bark is a constituent of the Pancha-vaikala (पञ्च वैकल) of Ayurvedic medicine and is used as a gargle in salivation, wash for ulcers and injection in leucorrhoea. The powdered root-bark is applied with honey in aphthous sore of children.

2. **Leaves**—The extract of the leaves made by boiling in water and concentrating the same on water-bath, is a highly potent preparation—as first described by the learned Kaviraj Chandicharan Sarma of Motihari. He has drawn the attention of the medical profession to the use of the Gular-leaf-Ext. This extract has got a wide range of applicability and the writer has obtained good results by the use of this inexpensive harmless preparation.

The extract is dissolved in 8 to 16 times of water and used externally in the following conditions with good results. The dissolved extract keeps well and is non-irritating.

1. *Externally*.—(a) In cases of injury to skin or flesh such as cuts, bruises, abrasions, bleeding and the like. (b) Injuries inflicted by horn or hoof of beasts such as oxen, horses, etc, detachment of nails, serious injuries caused by weapons. (c) Pimples of all sorts, developing sores, sinuses etc. (d) Perforated palate—Due to syphilis, or some other causes. (e) Swelling in the throat, sore-throat, pain in passing saliva down. (f) In tooth-ache, sore-gum, pus pockets in the root of teeth. (g) Sore, cut or gangrene on tongues, etc. (h) Hurt in the eye, bleeding, redness, pain, swelling, or sore eyes etc. (i) Pain or sore in the ear. (j) Nasal sores. (k) Ugly cracked soles and the like. (l) Ulcers due to deleterious blood, blood infected with germs of diseases, Syphilis, Actinomycosis, in thighs, hands etc. (m) Burn by fire.

2. *Internally*, -- (a) In dysentery and loss of appetite, dilute 10 to 40 grains by weight of Extract in 4 oz. of water and drink morning and evening. Abstain from heavy, exciting and fatty food such as pulse, ghee, oil etc. Use butter-milk during day time. (b) In Gonorrhoea, drink as per direction above. If practicable, add a pinch or two of cubeb powder. (c) In Diabetes (Prameha) use it thrice a day with water only.

3. **Fruit**—The juices of the fresh fruits, are used as an Anupan with metallic medicine in cases of diabetes and urinary troubles. Dried fruit one tola is given with sugar and honey in cases of menorrhagia and hæmoptysis.

GLORIOSA SUPERBA

=लाङ्गुली=

(*N. O.*—LILIACEAE)

Vern. Sans.—La'ngalika, Agnisikha'. **Beng.**—Bisha-la'nguli.
Hind.—Kalihari. **Eng.**—Superb Lily. **Tam.**—Kalaipai-kizhangu
Tel—Kalappa-gadda. **Guz.**—Kalalavi.

Habitat.—This climbing plant is common in Bengal.

Parts Used.—Tubers.

Collection and Storage.—The tubers deteriorate rapidly and so should be cut into thin slices and dried and kept in an air tight container.

Chemical Composition.—Warden describes two resins and a bitter principle in the root and names it Superbine and considers it identical with that of *urinea scilla*, the ordinary squill.

Physiological Action.—Tonic, antiperiodic, alterative and purgative. According to the *Nirghantas*, the root is purgative hot, (pungent) ; it increases the secretion of bile.

Dose :—of the powder, 5 to 20 grains.

Purification.—Surgeon-Major Thomson states that before being used for internal purposes, it is cut up into thin slices and soaked in butter-milk and salt for four or five days, and then dried ; by this process its poisonous properties are supposed to be removed. Kavirajes also purify it by putting the slices of the root into cow's urine for one day.

Therapeutics.—*Externally.*—

(1) The root, powdered and reduced to a paste, is applied to the navel, supra-pubic region and vagina with the object of promoting labour pains.

(2) In retained placenta, a paste of root is applied to the palm and soles, while powdered nigella seeds and long pepper are given internally with wine.

(3) If a paste of root is applied to an abscess, it hastens its maturation.

(4) If a piece of iron or stone penetrates deep into the body and if the part is allowed to remain covered with the paste of the root, the piece of iron or stone comes out easily.

(5) A paste of the root is very beneficial for the bites of poisonous snakes, and for scorpion and centipede stings.

(6) It is also applied in parasitic affections of the skin.

Internally.—

(1) Moodeen Sheriff says "The root is not so poisonous as is generally supposed. I have taken it myself in small quantities, gradually increasing the dose to 15 grains. There were no bad effects, but, on the contrary my appetite improved, and I felt distinctly more active and stronger. I have been using it in my practice during the last sixteen or seventeen years, and consider it to be a pretty good tonic and stomachic. Dose from 5 to 12 grains three times daily"

(2) The starch obtained from the root by washing is given internally in gonorrhoea.

—0—

GLYCYRRHIZA GLABRA.

= यष्टिमधु =

(*N. O.* LEGUMINOSÆ .

Vern. Sans.—Yashti madhu, Madhuka. **Eng.**—Liquorice. **Fr.**—Reglisse. **Hind.**—Mulatthi. **Guz.**—Jethi-madh. **Mar.**—Jeshti-madh. **Tam.**—Anti-maduram. **Tel.**—Yashti-madhukam.

Habitat.—Europe. Northern Asia, Afganistan etc.

Collection and Storage.—It is to be kept in a dry place, because the moist heat of Bengal deteriorates it largely.

Chemical Composition.—The chief constituents are—

- (1) *Glycyrrhizin*, a yellow amorphous glucoside, $C_{24} H_{36} O_9$, probably in combination with ammonia. With acids this yields a very bitter substance, glycyrrhetin, and glucose
- (2) *Asparagin*.
- (3) Grape, sugar, resin, starch, gum and malic acid,

Physiological Action.—Cooling, demulcent, expectorant, diuretic, emmenagogue, and gentle laxative. When chewed or sucked it increases the flow of saliva and mucus; hence acts as a throat emollient. It stimulates the mucous membrane, esp. of air passages where its action is more local than general.

Dose.—Of powder, 15 to 40 grains; Ext. Glycyrrhizae Liquid— $\frac{1}{2}$ to 1 fl. dr. Pulv Glycyrrhizae Compositus—60 to 120 grains. (B. P.)

Therapeutics :—

(1) Though it is not indigenous to India, has been used in Hindu medicine from a very remote period, and is mentioned by Susruta.

(2) It is an excellent demulcent for sore throats.

(3) It is much used for flavouring medicinal decoctions, oils and *ghritas*.

(4) It is used to hide the taste of nasty medicines, and as a basis for pills.

(5) The Compound Liquorice powder is laxative by virtue of senna and sulphur contained in it.

(6) Those who are suffering from heart-trouble, should take its decoction with *kāthi*, sugar and water.

(7) In Jaundice, its powder should be taken as linctus with honey.

(8) Dysuria and oedema of the belly due to urinary trouble are relieved by it. It should be taken with milk and raisins.

(9) It is a good medicine for hoarseness of voice, asthma and in irritation of the larynx.

GMELINA ARBOREÀ.

= गम्भारी =

(*N. O. VERBENACEÆ*).

Vern.—*Sans.*—Gambha'ri. *Hind.*—Gumha'r. *Beng.*—Ga'm'ari. *Mar.*—Sihvani. *Tam.*—Gumadi. *Tel.*—Gumar-tek. *Guz.*—Shewan.

Habitat.—North-West Himalaya, Ceylon, Chittagong, Eastern Bengal.

Parts Used.—The root, leaves and fruit.

Collection and Storage.—Should be kept in a dry place.

Chemical Composition.—The root contains a yellow viscid oil, resin, an alkaloid, a trace of Benzo'ic acid. The fruit contains butyric and tartaric acids, an alkaloid, saccharine matter, resin and a trace of tannin.

Physiological Action.—The root is demulcent, stomachic, tonic and laxative. The fruit is sweetish bitter and cooling.

Therapeutics.—*Internally,*

(1) The root is one of the ingredients of *Dasamula* and is used in the form of an infusion or decoction in fever, indigestion, anasarca etc.

(2) Bangasena says that root taken with liquorice, honey and sugar increases the secretion of milk.

(3) The fruit enters into composition of several cooling or refrigerant decoction for fever and burning of the body. The following is an example. Take of the fruits of *Gmelina arborea*, *Grewia Asiatica* (*parushakā*), liquorice root, red sandal wood, and the root of *Andropogon muricatus* (*ushira*), equal parts, in all two tollas, water thirty two tol'as, and boil till reduced to one half. This decoction is used as a drink in bilious fever. (*Chakradatta*)

(4) The juice of the young leaves is used as a demulcent in Gonorrhœa, cough etc, alone or with other demulcents.

(5) If a whitlow is covered with seven tender leaves, which is kept tight by a bandage, it heals up rapidly.

(6) The wood is used for making artificial limbs, stethoscopes etc.

* GYMNEMA SYLVESTRE

(N. O. ASCLEPIADACEAE.)

Vern. *Sans.*—Meshashringi. *Eng.*—Periploca of the woods ; Small Indian Ipecacuanha. *Hindi.*—Gurmar, Merasingi.. *Beng.*—Meda shinge. *Tam.*—Shirukurinja. *Tel.*—Podapatri.

Parts used.—The root and leaves—

Habitat—Central and Western Peninsula from the Konkan to Travancore ; throughout the Bombay Presidency, in monsoon forests common in hedges in the Dharwar District also at Mahabaleshwar, Bundelkhand, Saharanpur, Bihar, Circars Flowering usually commences in April and continues until August. The fruits develop rapidly after the flowering is over and are full sized by October to December.

Collection and Storage—Should be kept well dried in an air-tight container.

History of the Drugs—Charak used Meshashringi as an antiperiodic. Vagbhata recommended it as a stomachic, Bhavamisra—describes it as bitter, stomachic, remover of cough, throat troubles, and pain in the eye, diuretic, a cure for poison and wounds.

Sushruta describes it as destroyer of “Madhumeha” and other urinary diseases.

The Root is esteemed as a remedy for snake bite ; but modern researches show that there is no foundation for it ; among the bourgeois classes of Bombay and Guzerat, the custom exists of chewing the fresh leaves to reduce glycosuria.

In Bombay & Madras Kavirajs recommended the leaves in the treatment of furunculosis and ‘Madhumeha’. U.S.P. Dispensatory mentions it as a remedy for parageusia and hallucinations of taste.

Chemical Composition—The active principles of the leaves, are known as gymnemic acid (allied to chrysophanic acid which exists as potassium salt (Hooper) Caius and Mhaskar isolated amorphous products, which resisted all attempts to separate them in a crystalline state and were quite unsuitable for analysis.

* Compiled from Indian Medical Research Memorandum (March 1930).

The amorphous products resembled aloes in appearance and contained anthraquinone like bodies.

The air dried leaves yield after ignition 11.45 per cent of inorganic matter, containing 'alkali' 46.76 ; phosphoric acid 6.73 ; ferric oxide 5.44 ; manganese 1.31.

Physiological Action.—The leaves when chewed benumb the taste for sweets and bitter such as sugar and quinine.

They stimulate the heart and circulatory system, increase urine secretion and activate uterus. They cause hypoglycaemia, which sets in soon after the administration of the drug by mouth or by injection, lasts for a variable time, is not proportionate to the dose and is never excessive. The drug has got no direct action on carbohydrate metabolism, and acts indirectly through stimulation of insulin secretion of the pancreas.

The presence of anthraquinone derivatives accounts for the laxative action of the leaves,

The drug appears to be useful in checking Glycosuria, when administered in doses of 30 to 60 grains of dry leaves.

Dose—10 to 20 grains (dry leaf) three times daily after meals.

Therapeutics.—Those persons who have been or are taking the leaf of *Gymnema* are unanimous in their praise of the drug. They say, that the inordinate craving for food, thirst, lassitude, polyurea sleeplessness, all disappear with its use leaving an intense feeling of well being.

The ease of administration, the stomachic, stimulant, diuretic and laxative properties, together with the mineral content make the whole drug as Nature's own prescription for the treatment of Glycosuria

30 to 60 grains of the dried leaf in divided doses for over a period of three months or more, may reduce glycosuria non-amenable to dieto-therapy.

The oils from the seeds of the three plants (1) *Gynocardia* O Kurzi are specific remedies for Leprosy and other skin diseases like sometimes mixed with other substances. The habitat, physical prop form of a chart for easy comparison.

Gynocardia Odorata.

Moderate sized, evergreen trees.

Fruits hard round 3—5, in diam.

grow in the stem and main branches.

The oil expressed from the seeds is said to be an excellent remedy for leprosy and acute eczema and other skin diseases.

The oil is a pale yellow liquid at ordinary temperature ; the odour resembling Linseed oil. $d_{25} = 0.925$ Acid Value—490. Sap. Value—1970 I. Value—152.8.

The oil is completely devoid of optical activity, *contains none of the members of the chaulmoogric series* and has been shown to consist of the Glycerylesters of the following acids :—

(1) Linolic acids and isomerides of the same series constituting the largest portion of the oil.

(2) Palmitic acid in large amount.

(3) Linolenic acids iso-linolenic acids —the latter predominating.

(4) Oleic acid in small quantities.

In addition to these the seeds contain 5% of a crystalline cyanogenetic glucoside, "Gynocardin" $C_{13}H_{19}O_9N$ and a hydrolytic enzyme "Gyanocardase"

Hydnocarpus Wigi

A tall tree ; fruit, a diam ; seeds used in west India as domestic remedy for ate skin diseases, Oil dressing for wounds and the

Oil expressed used for tions, mixed with other substances, mandated as a substitute for (i.e. oil from *Gynocardia*)

Fatty oils from seeds of Chaulmoogra oil both in properties and chemical composition obtained from the oil contain chaulmoogric acid and a lot of the same series. This logue has the formula C_{16} is designated Hydnocarpic

Hydnocarpic acid in alcohol in glistening leaflet and has (a) $D + 68$ solution.

Contains large percent of carpic acid i.e. about 10% moogric acid 7.3% ; and economical and effective in of leprosy.

GYNOCARDIA ODORATA

(CHAULMOOGRA ODORATA)

HYDNOCARPUS WIGHTIANA

तुवरक

TARAKTOGENOS KURZII (KING)

HYDNOCARPUS HETROPHILLEAS.

चालमुगरा

(*N. O.*—BIXINCAE.)

Vern. Sans. Tubarak. *Hind., Bomb.* chaulmugra. *Beng.* chalmugra.

Habitat.—Himalayas and Khasia Hills and Southern Concan along the Ghats.

(Note—Oil chaulmoogra or oil gynocardica or its derivatives is being largely used in medicine as it is but the source of the so-called chaulmoogra seed from which the oil is expressed is not from the tree *Gynocardia Odorata*, but from *Taraktogenos Kurzii* (King) which grows wildy in Eastern and southern slopes of the Paguyoma, forests of Sylhet, Chittagong and Mulan district, Upper Burma. The oil from the seeds of *gynocardia odorata* is different in chemical composition and other physical characteristics from the oil obtained from *Taraktognos kurzi* :)

Hydnocarpus Wightiana—the true Tubarak as described in the *Sususrata Samhita*, grows wildy in the ranges of Western. peninsula from the S. Concan along the cost range.

Parts Used.—The seeds and oil.

Collection and Storage.—The seeds are brought to Calcutta, chiefly from Chittagong, and are of two kinds—(1) mature seeds with brown kernels, rich in oil, (2) immature seeds with black kernels, poorer in oil. The seeds arrive in the market after the rainy season in November and December. To extract the oil, the kernels are separated from the shells and

dried in the Sun. They are then pounded with a pestle and mortar, and the broken kernels put into canvas bags and the oil expressed with the aid of fire in a castor-oil mill, or by simple pressure without any heat (cold drawn)

So, two kind of oil are met with in the market.

(1) *Cold drawn*—clear, bright, straw coloured.

(2) *Heat drawn*—muddy and precipitating a sediment of earthy colour.

The cold drawn oil is the best for use.

Chemical Composition.—The chief constituents are gyno-cardic and hydnocarpic acids, (See table)

Physiological Action.—Internally, alterative and tonic in medicinal doses ; but produces severe irritation in the stomach and bowels in larger doses. Externally, stimulant and said to improve the quality of the blood. It may be substituted for Cod-liver oil, iodine and arsenic.

Doses.—Of the Oil, from five to fifteen minims, or until it can be tolerated by the stomach and bowels. Of the Powderd seeds, from five to fifteen grains or more, gradually increased. Of the two, Tubarak is more effective than Chaulmoogra.

Therapeutics :—

(1) The active principle of the oil (gyno-cardic acid) is much used in various forms of skin disease, both externally and internally. The acid rarely produces nausea, and is best administered in the form of a pill containing half a grain to three grains, for eczema.

(2) Moodeen Sheriff, Khan Bahadur, says :—"The oil is the best of all the remedies in use for leprosy. The seeds of this plant are also useful in the same disease but to a less extent, and their use in sufficient quantity in the form of pill or powder is rather inconvenient. If the attack of the disease is slight and of short duration, the beneficial influence of the oil is remarkable and rapid but if severe and of long standing, no distinct improvement takes place until it is persisted in for months or years. It is useful in all the forms of leptory (tubercular, anaesthetic and mixed), but the first named variety is the one which is most

benefitted by it, the internal use of the oil should always be assisted by its external application to the affected parts. If used alone externally, it proves itself too strong in some cases and excoriates the tender and diseased parts or renders the ulcers irritable and painful. I have therefore, generally employed it in combination with *Margosa oil* in the proportion of one of the former to two or three of the latter. The Chaulmugra oil is also very useful in lepra vulgaris, psoriasis, secondary and tertiary syphilis. I have recently tried it in some cases of phthisis pulmonalis and scrofula in combination with cocoanut oil, and with pretty good results. Mixed with cocoanut oil, it can be administered in much larger doses without any bad effect, than when used alone. During the use of this oil in leprosy, the patient may be kept on a good and nourishing diet; but is prohibited from taking the following articles:—Fish, prawns, brinjal, greens, curdled milk, lime juice and ardent spirits.” Butter, ghee and milk aid its action.

(3) The oil has been used in London Hospital as a remedy for stiff joints caused by Rheumatism, being rubbed and also given internally in doses of 3 to 4 minims, 3 times a day after meals; the dose may be gradually increased. For children 1 to 2 minims once a day is sufficient; it may be combined with Cod-liver oil.

(4) Dr. Young of Florence has used the oil with advantage in macular and anaesthetic leprosy; during treatment, bronchial affections disappeared.

(5) In America, it has been used as a remedy for sprains and bruises and for sciatica; over-doses (10 minims, three times a day) cause vomiting and purging, with loss of appetite; but all people are not equally affected by the drug.

(6) In chest affections and phthisis it may be rubbed into the chest with advantage.

After recent researches in the treatment of Leprosy by Sir Leonard Rogers and Dr. Muir of the Tropical School of Medicine they recommend the use of the Gynocandate of Sodium or Hydnocarpate of Sodium with other antiseptics, as deep intramuscular injections or intravenous injections; but our experience in the

treatment of cases of Leprosy in our outpatient clinics, by the injection method of treatment, is not encouraging ; patients have got to call frequently for the injections and sometimes they develop painful abscesses in parts ; hence we always prefer the use of the whole pounded drug or the oil taken by the mouth, as these modes are safe, certain and convenient.

HEMIDESMUS INDICUS.

= अनन्तमूल =

(*N. O.*—ASCLEPIADEAE)

Vern. Sans.—Anantamula, Sa'riya'. **Hind., Beng.**—Anantamul. **Eng.**—Indian Sarsaparilla. **Fr.**—Salsepareilla de 'Inde. **Tam.**—Nanna'ri. **Tel.**—Sugandhi-pa'la. **Guz.**—Upalsa'ri.

Habitat.—This climbing plant is found throughout India and is common in Bengal.

Parts Used.—The roots.

Collection and Storage.—The pods should be collected just before they burst and the plant can be cultivated from the seed. It should not be older than one year.

Chemical Composition.—The presence of the aroma and the taste of the drug are due to a volatile oil, a crystallizable principle, hemidesmine, and a crystalline stearopten called smilasperic acid, which can be obtained in part by boiling the root with water.

Physiological Action.—Valuable alterative, tonic, demulcent, diaphoretic and diuretic. It is said to possess the sudorific and alterative properties of Jamaica sarsaparilla.

Dose.—The decoction, 1 to 2 chattacks ; powder of the root, 20 to 60 grains.

Therapeutics.—(1) The powder fried in butter is given to children, in thrush.

(2) With honey, it is given in rheumatic pains and boils.

(3) As a diuretic, its infusion with cow's milk is given in scanty and high coloured urine, strangury and gravel.

(4) As a diaphoretic and tonic, it is given in fevers with loss of appetite and disinclination for food.

(5) As an alterative it is given in chronic rheumatism, skin diseases, scrofula, syphilis, cachexia, constitutional debility etc.

(6) Take of *anantamula*, root of *cyperus rotundus* (*mustaka*), ginger, and the root of *Picrorrhiza kurroa* (*katuki*), equal parts, in all two tola's and reduce them to a paste with water. This dose administered with warm water in the morning, is said to clear the bowels and relieve fever. (भैषज्य रत्नावली)

Ichnocarpus Frutescens—*Sans.*—सारिवा Sa'riva ; *Beng.*—Shyama'lata ; *Hind.*—Dudhilata, a climbing plant found throughout India. It belongs to the Natural Order Apocynaceae. The properties of the roots of this plant are said to be identical with those of *Hemidesmus Indicus* and is an alterative tonic, diuretic and diaphoretic. These two drugs are often used in combination under the designation of Sa'rivadavya. (सारिवाद्वय)

A decoction of the roots of colocynth, *anantamula*, *sariva* and *Hedyotis biflora* (*parparla*), prepared in the usual way, is administered with the addition of powdered long pepper and bdellum in chronic skin diseases, syphilis, elephantiasis, loss of sensation and hemiplegia. (शार्ङ्गधर)

HERPESTIS MONNIERA

= ब्राह्मी =

(*N. O.*—SCROPHULARINEAE.)

Vern. *Sans.*—Brahmi. *Hind.*—Barambhi. *Beng.*—Dhop-Chamni, Brihmi-sak. *Mar.*—Nir-brami. *Tam.*—Nir-brami. *Tel.*—Sambrani-chettu.

Habitat.—This creeping plant is found in marshy ground throughout India.

Parts Used.—The whole plant.

Collection and Storage :—To be well dried in the shade and kept in a dry place.

Chemical Composition.—A trace of oily matter which is soluble in alcohol and of an acid reaction ; tannin, an alkaloid, soluble in ether and chloroform ; an organic acid, two resins, both soluble in alkaline solutions and one readily soluble in ether.

Physiological Action —Diuretic, aperient and tonic. (See Appendix.)

Dose.—Juice of the plant, about $\frac{1}{2}$ ounce. Powder—5 to 10 grs.

Therapeutics.—(1) The plant is applied externally hot to the chest in bronchitis and cough in children.

(2) The leaves fried in clarified butter are taken to relieve hoarseness.

(3) Half a tola of the fresh juice of the leaves, with $\frac{1}{4}$ tola of *páchaḥ* (*Saussurea auriculata*) root and honey, is recommended to be given in insanity.

(4) It is useful in that sort of stoppage of urine which is accompanied with costiveness.

(5) It is also useful in nervous debility, seminal weakness, epilepsy etc.

(6) A powder composed of equal parts of *brahmi*, *Acorus Calamus* (*vachá*), chebulic myrobalan, root of *Justicia Adhatoda* (*vásaka*) and long pepper, is given with honey in the hoarseness of phthisis.

(7) *Brahmi Ghrita* (ब्राह्मी घृत)—Take of old clarified butter four seers, fresh juice of *brahmi* four seers, *Acorus calamus* (*vachá*), *páchaḥ* root, and the root of *Canscora decussata* (*sankha-pushpi*), equal parts, in all thirty-two tola's. in the form of a paste and boil them together till the watery portion is evaporated.

HOLARRHENA ANTIDYSENTERICA

=कुटज=

(N. O —APOCYNACEAE)

Vern. *The Bark.* *Hind.*—Kura, Kaureya. *Beng.*—Kurchi. *Mar.*—Kuda, Pandhara-kuda. *Guz.*—Kuda, Doula-kuda. *Tam.*—Kulap-palai. *Tel.*—Amkudu. *Can.*—Kodamuraka, Kudasiga.

The seeds—*Hind.*—Karwa-indarjau. *Beng.*—Tita-indarjau. *Tam.*—Kulappalai-virai. *Tel.*—Amkudu-vittulu. *Mar.*—Kadu-indarjau. *Guz.*—Kadvo-indarjau. *Can.*—Kodu-murakan-bija.

Habitat.—Widely distributed throughout India and Burma and is abundant at the sal and mixed deciduous forests in dry high land.

Parts Used—The Seeds and Bark.

Collection and Storage—The bark should be collected from mature trees, which are producing fruits every year and well dried and kept in a dry place. If kept in moist place the barks deteriorate.

Chemical Composition :—

The Seeds—Contains a fixed oil about 30%. This oil is a mixture of oleic 46%, stearic, palmitic and Ricinoleic acid 13.2% (Caius & Mhaskai). Besides, it contains mucilage, dextrin, glucose, woody substance and alkaloid 0.25%.

The Bark—Contains potassium, sodium, calcium and iron salts, resin and gum (about 10%) and other organic substances and a mixture of three alkaloids (about 1.2 to 1.3% according to the quality of the bark) *Kurchicine*, *kurchine* and *conessine* have been till now isolated.

Physiological Action.—The action of the seeds, depends mostly on the contained oil which is a mixture of fatty acids (oleic acid 46.85%, Ricinoleic acid 13.2% and stearic, palmitic acid etc.) The fatty acids contained in the seeds, are converted into soaps as these enter the intestinal canal and increase the flow of bile and act beneficially on the intestinal mucous membrane in cases of bowel troubles esp. Diarrhoea and Dysentery and the contained alkaloids act specially on the intestinal

flora. The action of the bark, principally depends on the contained alkaloids as well as to the resins and gums contained in it (20·8%).

Recent researches have shown that the total alkaloid of *H. anti-dysenterica* is more efficacious than emetine, particularly in chronic cases ; and it acts both in acid and alkaline medium whereas emetine is active only in alkaline medium.

When the whole drug is administered in the powdered form, or in the form of a solid extract containing the gums resins and alkaloids—we get the most beneficial results.

The Bark and Seeds are described in the *Nighantas* as bitter, astringent, cooling and digestive, a remedy for piles, dysentery, bile leprosy and phlegmatic humours. *Susruta* says these are expectorant, antidote to poisons, cure dysuria, urinary and skin diseases, check nausea and vomiting, remove pruritus, improve the condition of bad ulcers, relieve pains of the stomach and check the derangements of humours.

The Bark and Seeds are also reputed to be antiperiodic, similar to cinchona alkaloids but do not produce nausea, vomiting or headache. They are given in fevers, chronic diarrhoea, dysentery, worms and internal haemorrhages. They are seldom given alone, generally administered in combination with a number of aromatics and astringents.

Dose.—of the powdered seeds 10 to 20 grains ; of the powdered Bark—30 to 60 grains ; of the total solid extract of bark,—2 to 5 grains containing the three alkaloids—Gums and resins.

Therapeutics—*Indrajav Seeds* powdered or infused in warm water, have been found very useful in mild forms of dysentery, complicated with worms in children. In the treatment of haemorrhoids they are given in the form of decoction made with milk and regarded as most efficacious.

In all varieties of Diarrhoea and Dysentery, powdered *Indrajav* seeds are beneficial in doses of 15 grains a day, gradually increased to 60 grains administered in 3 or 4 portions. The frequency of motions decreased within 24 hours ; there was less griping and tenesmus and gurgling of the abdomen and the patient

experienced a sense of comfort. Faecal matter appeared on the third day, soon increased in quantity and consistency and became greenish in colour on the 6th day. Within a week yellow bile was visible in the stools and number of motions returned to normal. (Caius and Mhaskar)

The seeds are seldom used alone in Ayurvedic or Unani practice but they enter into the composition of a good many prescriptions, in combination with a number of aromatics and astringents. We narrate here a few important ones.

Bhoonimbadi Churna (भूनिम्बादि चूर्ण)—Take of tubers of *Cyperus rotundus*, bark of *Halarrhena antidysenteric*, seeds of *H. antidysenterica*, *Picrorhiza Kurroo*, *Piper longum*, *P. nigrum*, *Plumbago Zelanica*, *Swerta chirata* and *Zingiber officinale* equal parts. Said to be a bitter tonic, intestinal tonic, antiperiodic and gastric stimulant, used in dyspepsia, chronic diarrhoea, fevers, dysentery and worms.—Dose 20 grains to be given thrice daily ; it is a useful combination but the action is slow.

Brihat Sudarsana Churna—(बृहदसुदर्शन चूर्ण). Contains seeds of *Indrajaya* 1 part, other reputed drugs 46 in number 1 part each, Chiretta 20 parts—All made into powder. Recommended in all malarial and chronic fevers, anaemia, enlarged spleen. Dose—40 to 60 grains for an adult.

This powder was tried in two cases of influenza (Broncho-pneumonia), 3 of malaria, 1 Bronchitis after influenza, 1 anaemia, 1 enlarged spleen and liver, 1 malaria with ascites, 1 cirrhosis of liver.—All the case were benefited (Koman). About two dozen Ayurvedic preparations contains this seed *Indrajab*.

Therapeutics.—*Kurchi Bark*—This bark constitutes the principal medicine for dysentery in the Indian Pharmacopæia and all writers are unanimous in recommending this drug.

1. *Freshly made infusion*—is made by adding one ounce of the powder bark to one pint of boiling water, infusing for six hours or more and straining. Dose 1 to 2 oz. three times daily. This is almost a specific in chronic dysentery of all varieties, whether acute or chronic, and whether complicated by fever or not.

2. *Liq. Extract*—1 in 1—Dose 15 to 20 drops for children and 1 to 2 drams for adults, give satisfactory results.

3. *Solid Extract of the whole drug*—as “Kurchidin” Tablets—is a preparation of real value. I have used it in my practice in acute and chronic cases. In cases of obstinate amoebic dysentery, stools cease to show cysts. Dose 5 grain tablets 3 or 4 times daily.

4. *Powdered bark*—upto 60 grs. daily, can be given to an adult in 3 or 4 portions ; no disagreeable or untoward symptom was noticed by Caius and Mhaskar—and gave satisfactory results in 70·11 % cases of amoebic, 67·27 % of non amoebic dysentery and in 45·00 % cases of diarrhoea other than dysentery.

5. A hot *docoction of the bark*, is used as a gargle in toothache.

In Ayurvedic practice it is administered in a variety of ways in combination with other medicines of which a few are narrated.

(1) **Batsakadi Pachan**—(बत्सकादि) Take of *Aconitum heterophyllum*, unripe fruit of *Aegle marmelos*, tubers of *Cyperus rotundus*, bark of *Holarrhena anti-dysenterica* and the root of *Pavonia odorata*, equal parts of each and boil with 16 times of water and concentrate to one-fourth.

(2) **Kutajadarimba Kashaya**—(कुटजडाडिम्ब कषाय) Take of root bark of *Holarrhena anti-dysenterica* and of the rind of the green fruit of *Punica granatum* each equal parts. Boil with 32 times of water till reduced to one-third.—Add honey $\frac{1}{2}$ part ; beneficial in obstinate cases of dysentery with blood and mucus.

(3) **Kutajaleha**—(कुटजलेह) Take of powdered *Holarrhena anti-dysenterica* bark 10 seers and water 64 seers. Boil down to 8 seers and strain. Boil again the strained liquid, till reduced to the consistency of a syrup and then add the following :—

Of seeds of *Cuminum Cyminum*, seeds of *Holarrhena anti-dysenterica*, berries of *Piper longum*, flowers of *Woodfordia floribunda*, artificial salts (sanchal and bit), rock-salt and native carbonate of potash each two parts mix and powder.

Efficacious in both acute and chronic varieties of dysentery with stools of different colours and accompanied with tenesmus.

Kurchi Bismuth Iodide and other fanciful preparations have come into the market but their effects are doubtful.

HYGROPHLA SPINOSA.

= कोकिलाक्षः =

(*N. O.*—ACANTHACEAE).

Vern. Sans.—Kokilaksha. **Beng.**—Kuliakhara. **Hind.**—Talmakhana. **Tam.**—Nirmulli. **Tel.**—Nirugobbi. **Guz.**—Ekharo.

Habitat.—This annual plant is common in moist places on the banks of tanks, ditches &c. throughout India and Ceylon.

Parts Used.—The whole plant including the root and seeds (known as Talmakhana).

Collection and Storage.—The plant is to be collected when the spikes are well developed and well-dried and kept in a dry place.

Chemical Composition.—It contains alkaloid “cholesterol”, manganese salts, fixed oil and mucilage. The decoction contains a considerable quantity of potassium chloride and sulphate on the presence of which the diuretic action of the drug depends. The seeds are glutinous and mucilaginous. They contain nitrogen 5% equivalent to 31% of albuminoids, 23% of yellow fixed oil and trace of alkaloid.

Physiological Action.—ITS ACTION ON THE HEART AND BLOOD-PRESSURE—

Blood-pressure in anaesthetised cat showed marked and continuous rise with 1 c.c. of the fluid extract of the whole drug 1 in 1. This rise of blood-pressure is still there after the section of vagi. And, that this effect is not due to vasoconstriction is proved by the ergotoxine and nitroglycerine experiments. Even after injection of ergotoxine to paralyse the vaso-motor nerve-endings, the drug raised the blood-pressure.

In another experiment, nitroglycerine was injected to dilate the vessels completely and the blood-pressure fell almost to zero. Then injection of the fluid extract of *H. spinosa* completely

IPOMAEA TURPETHUM

=तेउडी=

(*N. O.*—CONVOLVULACEAE.)

Vern.—*Sans.*—Trivrit. *Hind.*—Nisot, Nakpatr, Pitohri. *Beng.*—Teori. *Tam.*—Shivadai, Shivadai-ve'r. *Tel.*—Tegada, Tegada-ve'ru. *Mal.*—Chiva'ka-ve'ra. *Guz*—Nishotar.

There are two varieties—*Sveta* (white) and *Krishna* (black).

Parts Used.—The dried root, stem and the root-bark.

Habitat.—This perennial plant grows wild nearly all over India.

Collection and Storage.—As the root and stem are very succulent, care should be taken in drying ; otherwise the parts may rot. The smaller the pieces into which the parts are divided, the sooner the operation will be complete. They should be exposed to the Sun for a day or so after which the dryage can be completed in the shade.

Chemical Composition.—Examined by M. Boutron Charland, it was found to contain a resin, a fatty substance, volatile oil, albumen, starch, yellow colouring matter, lignin, salts and ferric oxide. The roots contain 10% of resin.

According to M. Spirgatis, the resin is a glucoside, turpethin " $C_{34} H_{56} O_{16}$ ", like that of other Convolvulaceae, insoluble in ether, but soluble in alcohol, to which it imparts a brown colour, not removable by animal charcoal. The resin is inflammable, burning with a smoky flame and emitting irritant vapours. It is brownish and yielding on pulverisation, a grey powder, which strongly irritates the mucous membrane (United States Dispensatory). Under the action of alkaline bases, it is transformed into Turpethic Acid ($C_{34} H_{60} O_{18}$) and by hydrochloric and other dilute acids, it is decomposed into Turpetholic Acid ($C_{16} H_{32} O_4$) and glucose (Watt's Dictionary).

Physiological Action.—Turpeth, when administered by the mouth, excites irritation of the stomach with nausea, colic and watery mucous stools ; in excessive doses, it excites inflammation of the gastro-intestinal mucous membrane and bloody

dejections. Like Jalap, it is a hepatic stimulant, increasing the secretion of biliary matter and rendering it more watery.

Dose of root-bark powder—10 to 40 grains.

Therapeutics.—Being a hydragogue cathartic, it is useful for the removal of dropsical effusions and in such cases it acts best in combination with ginger and bitartrate of potash. As this is quite equal to jalap and superior to rhubarb in its action, it is preferable to both, having no nauseous smell or taste and for being a very efficient and satisfactory purgative, when used alone. The dose is somewhat larger than that of jalap, but this is no disadvantage, as long as it is safe and free from nauseous taste and smell.

In the *Nighantas*, it is described as pungent, cathartic, dry, sweet and hot, a dispellant of wind, fever, phlegm, bile and melancholy, bitter and digestive.

It is one of the most common cathartics and has probably been in use all over India, from a very early date. The usual method of administration, is to rub down, about a dram of the root or stem with water and add to it some rock-salt and ginger or sugar and black pepper. It is particularly beneficial in rheumatic and paralytic affections. Combined with chebulic myrobalans, it is useful in melancholia and dropsy.

Na'ra'cha Churna (नाराच चूर्ण)—Take of *Trivrit* root, eight tola's, long pepper two tola's, sugar eight tola's; powder and mix. About a scruple of the powder is recommended to be taken before meals, in constipation with hard faeces.

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MALLOTUS PHILIPPINENSIS.

= कम्पिल्ल, रेचनक =

(*N. O.* EUPHORBIACEÆ).

Vern. Sans.—Kampilla. **Hind.**—Kapa'la, Kama'la. **Beng.**—Kamila. **Mar.**—Kapila, Kapita, Kamila. **Guz.**—Ka'mpilla. **Tam.**—Kapli, Kapila. **Tel.**—Ka'pila-pod.

Parts Used.—The glandular powder from the ripe fruit of the plant.

Habitat.—The tree is fairly abundant in the forests of Puri and Singhbhum.

Collection and Storage.—In the thick forests, it bears few flowers and fruits. The flowering season is December, and the fruits mature in January and February. When ripe, it bursts open and a dull-red substance escapes and falls on the ground. This is collected. It is very difficult to get it in pure state.

Chemical Composition.—Resins 80%, tannic acid, gum; volatile oil, *rottlerin*, the active principal constituent, albuminous matter 7%, colouring matter, cellulose 7% and ash 4%.

Physiological Action.—Cathartic and anthelmintic.

Dose.—20 grains to about 2 drachm.

Therapeutics.—(1) As an anthelmintic, it is used to kill and expel intestinal worms. It is given with treacle: Dose—one tola.

(2) It is prescribed for worms in combination with the seeds of *Embelia Ribes* (vaverang), chebulic myrobalan, carbonate of potash and rock salt (*Chakradatta*). Dose—about a drachm, with butter, milk.

MORINGA PTERYGOSPERMA.

= शोभाञ्जन =

(*N. O. MORINGEAE.*)

Vern.—*Sans.*—Sobha'njana. *Hind.*—Sahjna. *Mar.*—Shegva, Shegat. *Tam.*—Murungai. *Guz.*—Saragavo. *Tel.*—Munaga. *Eng.*—Horse-radish tree. *Beng.*—Sahjna.

Parts Used.—The leaves, flowers and pods are used as pot herb (vegetables for curry). The stem bark and root bark are used for medicinal purposes. The tree yields a gum which is white, when it exudes, but turns gradually to a mahogany

colour, and belongs to the tragacanth series but owing to its dark colour is not of any importance. From the seeds, a clear limpid colourless oil is extracted by pressure ; this is known as Ben oil. The root is an efficient substitute for horseradish.

Habitat.—A tree wild in the Sub-Himalayan tracts from the Chenab to Oudh, but very commonly cultivated near homesteads especially in Bengal and Assam.

Collection and Storage.—The tree flowers in the month of February and produces long whip like beans in March and April. The bark of the tree as well as its roots should be collected just before the flowering season, well dried and kept in an air-tight container.

Varieties.—According to the colour of the flowers—three varieties are seen. (1) White—the common variety seen all over Bengal. (2) Red flower—Sajina of this type grows in the District of Maldah and (3) Blue or Black flower tree is scarce.

Chemical Composition.—The bark contains a white crystalline alkaloid (occurring in the spirituous extract), 2 resins (one soluble and the other insoluble in ammonia), an inorganic acid, mucilage and ash 8 p.c. The root yields an essential oil very pungent and offensive in odour. The husked seeds yield a fixed oil 36 p.c. known as *Beni oil*. It contains 60 p.c. of liquid oil and 40 p.c. of white solid fat.

Physiological Action.—The fresh root is stimulant, carminative, stomachic, stimulant and diuretic ; and the flowers also possess a slight stimulant property. The bark, used externally is rubefacient and vesicant. The powdered root is a fair substitute for the mustard flour.

Dose.—*Fresh juice of the bark*— $\frac{1}{2}$ to 2 drams ; of the powdered bark—5 to 20 grains.

Therapeutics.

(1) Applied externally in the form of a paste, the fresh root-bark and the bark act as a good vesicant and rubefacient. The former is much superior to the latter in this respect.

(2) Chakradatta recommends the decoction of its root bark in calculous affection ; it is useful in uric acid diathesis,

its decoction is also recommended in ascites, enlarged spleen, in internal and deep seated inflammation and abscess, with asafoetida and rock salt.

(3) The decoction is also used as a gargle in sorethroat.

(4) The bark is emmenagogue, abortifacient. $\frac{1}{2}$ oz. dose of the bark is said to be used to procure abortion.

(5) The gum with milk or arachis oil is poured into the ear in earache.



MUCUNA PRURIENS.

=आलकुशी=

(*N. O.*—LEGUMINOSÆ.)

Vern.—*Sans.*—Atmagupta, Va'nari. *Ben.*—Alkusi, Ka'ma'ch. *Hind.*—Kiwachh. *Mar.*—Kuhili. *Tam.*—Punaik-kali. *Tel.*—Pilli-adugu. *Eng.*—Cowhage. *Fr.*—Petit pois pouilleux.

Parts Used.—The seeds, root and legumes.

Habitat.—The Himalayas and the plains, Ceylon, and Burma.

Collection and Storage.—It should be kept in a cold place in air-tight state.

Chemical Composition.—Resin, tannin and fat and a trace of manganese. The seeds are found to contain a free fatty acid and its glyceride (probably oleic acid) an acid-resin and albumen.

Physiological Action.—The seeds are astringent, nerve tonic and aphrodisiac. The root also is a nerve tonic and diuretic. The hairs covering the seed-pods are vermifuge. They work mechanically by injuring the worms and promoting their expulsion. They are locally stimulant and mild vesicant.

Dose :—The powder of the seeds, 20 to 40 grs ; of hairs—2 to 3 grains

Therapeutics.—(1) The seeds are prescribed in leucorrhoea, spermatorrhoea etc., and in cases requiring an aphrodisiac action.

(2) Take of the seeds of *Mucuna pruriens* and the fruits *Tribulus terrestris* (*gokshura*) equal parts and administer in doses of about a drachm with sugar and tepid milk, (*Susruta*).

(3) *Vanari vati* (*वानरी वटी*)—Take of the seeds of *Mucuna pruriens* thirty-two tola's, boil them in four seers of cow's milk till the latter becomes thick. The seeds should now be decorticated and pounded, then fried in clarified butter and made into a confection with double their weight of sugar. The mass should then be divided into balls which should be steeped in honey. Dose, about a tola. This preparation is said to be the best of aphrodisiacs (*Bha'vaprakāsa*).

MUSA PARADISIACA.

= कदली =

(*N. O.*—SCITAMINEAE.)

Vern. Sans.—Kadali, Rambha. *Hind.*, *Guz.*—Kela. *Beng.*—Kala. *Eng.*—Plantain. *Fr.*—Bananier. *Mar.*—Kel. *Tam.*—Vazhai-pazham.

Parts Used.—The fruits, leaves, stems and roots.

Habitat.—Cultivated in every place of Bengal.

Collection and Storage.—The old leaves are collected, dried and burnt to ashes for washing purposes. As the stems of the plantain are cut down soon after the fruit is gathered, there is a large quantity of leaves and stalks available in all gardens where it is cultivated.

Chemical Composition :—The Plant contains about 37% of dry matter. The growing parts of the plant contain much tannic and gallic acids. The sound ripe fruit contains 22% of sugar, 16% being crystallizable. After it has become quite ripe there is a proportionate diminution in crystallizable sugar and

increase of inverted sugar. An over-ripe fruit contains 2·8% of crystallizable and 11·84% of uncrystallizable sugar, being a total of 14·64% or $\frac{2}{3}$ of the original quantity. Besides sugar, it contains starch, albuminoids 4·8%, fats up to 1%, non-nitrogenous extractives 6 to 13% and ash containing phosphoric anhydride, lime, alkalies, iron etc. "There are large quantities of C. Vitamins and a certain amount of B. Vitamins in it. But there is a conflict of evidence over the existence of A. Vitamins. The vitamins in the banana promote growth". ("Dr. Eva Sopp in the "Medical Review" March 1925.) Green plantain contains a large amount of tannin. Composition of the juice of the flower-stem of the plantain is potash, soda, lime, magnesia, alumina (with a trace of ferric oxide), etc. The juice of the tender roots contain much of tannin.

Physiological Action.—The ripe plantain is demulcent and nutrient. The unripe one is cooling and astringent and in the dried state it is antiscorbutic. The fully ripe fruit is laxative, when taken in the early mornings. The root is antibilious, and considered to be a valuable alterative. The juice of the plant is styptic.

Dose :—Of syrup of bananas, a teaspoonful.

Therapeutics.—(1) If the juice of the stem is warmed and put in ear, it will relieve the pain of otalgia.

(2) The starch prepared from the unripe fruits is used in bowel complaints.

(3) A syrup of banana is given in chronic bronchitis with benefit. The dose is a tea-spoonful every hour.

(4) The root is used as an anthelmintic.

(5) In hæmoptysis and hæmorrhagic fluxes the juice of the stem obtained by incisions is very beneficial.

(6) The fruit is used in soreness of the throat, dry cough and in irritability of the bladder.

(7) The sap is used to allay thirst in cholera.

(8) The young leaves are used as cool dressing for blistered surfaces.

(9) The young leaves are also used as a green shade in ophthalmia and other eye diseases.

10. Plantain, being entirely free from acidity is recommended for such patients as have delicate stomachs.

11. It is used as a mild, demulcent, astringent diet in cases of dysentery,

12. Ripe plantain, well beaten up with pulp of old tamarind and sweet old treacle or sugar-candy, is a remedy for dysentery at the commencement of an attack.

13. Flour, made out of green plantain, dried in the sun, is used in the form of *chapatis* in cases of dyspepsia with troublesome flatulence and acidity. The *chapatis* are taken dry with a little salt.

14. A combination of ripe plantain one ounce, tamarind, half ounce and common salt $\frac{1}{4}$ oz. is most efficacious in dysentery. The patient should be kept quiet and placed on low diet.

15. The ashes, produced by burning the plant, contain a large amount of potash salts and are used as an ant-acid in acidity, heart-burn and colic.

16. The tender fruit is used as a diet for patients suffering from haemoptysis and diabetes.

MYRICA SAPIDA

= कट्फल =

(N. O. MYRICACEAE.)

Vern.—*Sans.*—Katphala. *Hind. Guz. Beng.*—Kaiphala, Ka'tphal. *Mar.*—Kayaphala. *Tam.*—Marudam-pattai. *Tel.*—Kaidaryamu.

Parts Used.—The bark.

Habitat.—It grows abundantly in Nepal, Khasia Hills, and Burma.

Collection and Storage.—It is to be kept in a dry place and air-tight container.

Chemical Composition.—The bark contains tannin, saccharine matter and salts.

Physiological Action.—Stimulant, alterative, aromatic, diaphoretic and astringent.

Dose.—Of the bark, 10 to 40 grains.

Therapeutics.—*Externally.*

(1) Its fine powder is used to strengthen the gums

(2) In piles, its paste with catechu, asafoetida $\frac{1}{4}$ th part each, is applied with good result.

(3) The oil prepared by boiling 1 part with 10 parts of sesame oil is very beneficial in otalgia.

(4) In headache, the snuff of the powder is useful.

(5) Ulcers heal rapidly if sprinkled with fine powder of the bark.

Internally.

(1) The bark is chewed to relieve toothache.

(2) *Katphaladi Churna* (कट्फलादि चूर्णम्) Take of the bark of *Myrica Sapida*, tubers of *Cyperus rotundus* (*-mustaka*), root of *Picrorrhiza Kurroa* (*Katuki*), *Curcuma Zedoaria* (*sati*), *Rhus succedanea* (*Karkarla sringi*), and the root of *Aplotaxis auriculata* (*Kushta*), equal parts ; powder and mix. This powder is given in doses of about a drachm with the addition of ginger-juice and honey, in affections of the throat, cough and asthma.

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NARDOSTACHYS JATAMANSI

= जटामांशी =

(*N. O.*—*VALERIANEAE*).

Vern. Sans.—Jata'mansi. **Hind.**—Chhar, Balchhar, Jatamasi. **Beng., Mar.**—Jatamansi. **Tam.**—Jatamashi. **Tel.**—Jatamamshi.

Parts Used—The Rhizome.

Habitat.—Grows plentifully at Alpine Himalaya, in Nepal, Bhutan and Sikkim.

Collection and Storage.—It should be kept in a cool dry place, in air-tight container.

Chemical Composition—Contains volatile oil, valeric and organic acids, resin, tannin and wax. It is an equivalent of ordinary Valerian Rhizome.

Physiological Action.—Aromatic, tonic, nerve stimulant, carminative, antispasmodic, deobstruent, diuretic and emmenagogue; sedative to the spinal cord. It promotes appetite and digestion. It is a good substitute for the official Valerian.

Dose.—Powder, 45 grains.

Therapeutics—

(1) It is prescribed as nervine tonic and aromatic adjunct in the preparation of medicinal oils and ghrilas.

(2) In doses of 45 grains, it is used as an expectorant in coughs and cold.

(3) It is used in treatment of epilepsy, hysteria and convulsive affections.

(4) It is also used in palpitation of the heart.

(5) It is administered suspended in mucilage with cinnamon water and is given as a carminative in cases of flatulence and as reflex stimulant in vomiting, palpitation.



NYCTANTHES ARBOR-TRISTIS.

= सेफालिका =

(N. O. — OLEACEAE.)

Vern. Sans.—Sephā'lika. **Hind.**—Hārsingha'r, Har, Siha'ru. **Beng.**—Sephālika. **Mar.**—Pa'rtaka, Khurasli. **Tam.**—Manja-pu. **Tel.**—Poghada. **Punj.**—Paku'ra.

Parts Used.—The leaves.

Habitat.—Grows all over Bengal. It is cultivated in gardens for the sake of its flowers.

Collection and Storage.—The flowers are collected by Indian women and children. They separate the orange coloured

tubes from the whole petals, dry them in the sun and preserve them for dyeing their clothes a beautiful buff or orange colour. The leaves are dried and kept in air-tight place.

Chemical Composition.—The flowers contain an essential oil similar to that of jasmine and which is utilised in perfumery. The leaves contain an alkaloidal principle named Nyctanthine ; they also contain an astringent principle, a resinous substance; colouring matter, sugar and a trace of an oily substance, similar to the oil of peppermint.

Physiological Action —Anti-periodic, alterative, anti-bilious, expectorant, cholagogue, laxative, mild bitter tonic and anthelmintic.

Dose :—Fresh juice of the leaves, $\frac{1}{2}$ to 1 oz. Of decoction, 2 to 4 ozs.

Therapeutics.—

(1) The decoction of the leaves is used as an alterative in obstinate cases of sciatica and rheumatism.

(2) The fresh juice of the leaves is given with honey in chronic fever.

(3) The juice of the leaves 1oz. is taken with a little honey in bilious fevers.

(4) The expressed juice of the leaves is given with a little sugar to children as a remedy for intestinal (thread and round) worms.

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OCIMUM BASILICUM.

=बाबुइ तुलसी=

(N.O.—LABIATÆ)

Vern. Sans.—Varvara. *Beng.*—Na'sbo, Sabja, Baboi-tulsi. *Hind.*—Na'zbo, Sabza. *Guz., Mar.*—Sabja. *Tam.*—Tirunitrupachchai. *Tel.*—Vibudi-pattri.

Parts Used.—The herb and seeds.

Habitat.—This small shrub, indigenous in the Punjab on low hills, is cultivated in Bengal.

Collection and Storage.—The plant is to be collected as soon as flowering takes place ; well dried and is to be kept in a dry place.

Chemical Composition.—The leaves contain a yellowish green essential oil which if kept for a time crystallizes and is then known as Basil-camphor. The essential oil contains a terpene.

Physiological Action.—Diaphoretic, carminative and stimulant. The seeds are mucilaginous, demulcent and diuretic. The juice of the plant is anthelmintic. The seeds are aphrodisiac in doses of 1 to 3 drams.

Therapeutics.—(1) The juice of the leaves is dropped into the ear in ear-ache.

(2) The juice of the leaves forms an excellent nostrum for the cure of ringworms.

(3) Bruished leaves is a good medicine for scorpion stings.

(4) The warmed juice of the leaves is given with honey in croup.

(5) The seeds, when steeped in water, swell into a mucilaginous jelly, and is taken with the addition of sugar in dysentery, gonorrhoea and cough.

(6) The powder of the seeds in doses of 1 to 3 drams is aphrodisiac.

(7) Take its leaves 1oz. and also ginger 1oz. Mix them well into a paste and make into 24 pills. Two pills will be taken every day, morning and evening with water. It is a very good medicine for chronic bowel troubles.

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OCIMUM SANCTUM.

=तुलसी=

(*N.O. LABIATE*).

Vern.—*Sans.*—Tulsi, Parna'sa. *Hind.*, *Guz.*—Tulsi. *Tam.*, *Tel.*, *Mal.*, *Beng.*, *Mar.*—Tulasi.

Parts Used.—The leaves, roots and seeds.

Habitat.—Everywhere in Bengal.

Collection and Storage.—The fresh leaves should be collected. It occurs in every household of Bengal.

Chemical Composition.—The leaves contain a yellowish green essential oil which if kept for a time crystallizes and is then known as Basi-camphor. The essential oil contain a terpene.

Physiological Action.—The root is febrifuge ; the seeds are mucilaginous and demulcent. The dried plant is stomachic and expectorant. Leaves are anti-catarrhal and expectorant.

Dose :—10 to 40 grains.

Therapeutics :—

(1) The dried leaves are powdered and employed as a snuff in ozoena.

(2) Mixed with lime juice, the leaves are used in ringworm as a paste.

(3) The leaf-juice is often used as an adjunct to metallic preparations, which are rubbed with it into a thin paste and then licked up.

(4) The juice of the leaves is given with the addition of black pepper in catarrhal fever.

(5) An infusion of the leaves is used as a stomachic in the gastric disorders of children and in hepatic affection.

(6) The root is given in decoction as a diaphoretic in malarial fevers.

(7) The seeds are given in disorders of the genito-urinary system.

(8) The juice of the leaves is dropped into the ear for ear-ache.

(9) The leaves enter into the composition of some compound decoctions for cough and affections of the chest, Take of the leaves of *Ocimum Sanctum*, *gulanha*, ginger, root of *clerodendron Siphonanthus* (*bha'rgi*) and *Solanum Jacquinii* (*Kantakari*), equal parts and prepare a decoction.

OLDENLANDIA CORYMBOSA

=पर्पट=

(N. O. RUBIACEAE.

Vern.—*Sans.*—Parpata. *Beng.*—Khetpa'para'. *Hind.*—Daman-papra. *Mar.*—Paripat. *Eng.*—two flowered Indian Madder;

Parts Uscd.—The entire plant.

Habitat.—This herb grows plentifully in the rainy season in fields and low ground on the banks of water courses in Bengal.

Collection and Storage.—It can be collected from the end of rainy season well dried and kept in a dry place.

Chemical Composition.—This herb contains an alkaloid and a large proportion of alkaline salts such as sodium, potassium and calcium, mostly as chlorides (See appendix).

Physiological Action.—Cooling, bitter tonic, alterative and febrifuge.

Dose.—The decoction, 2 to 4 ounces. Powder 40 grains. Liq. Ext. (1 in 1) 1 to 2 drams.

Therapeutics.—(1) The juice is applied in burning of the palms of the hand and soles of the feet from fever.

(2) For burning at the pit of the stomach, the Liq. Ext. is used internally with a little milk and sugar.

(3) The decoction of the plant is used in bilious fever, with irritability of the stomach.

(4) In *Vertigo a stomacho* i.e. giddiness due to gastric derangement the Liq. Ext. of the Khetpapra (1 in 1) in one dram doses, diluted with an aromatic water three times daily acts beneficially and cures the patient in a couple of days.

(5) Panchabhadra (पञ्चभद्र)—Take of *parpata*, tubers of *Cyperus rotundus* (*mustaka*), *gulancha*, *chireta* and ginger, equal parts, in all two tolas, and prepare a decoction. This preparation is much used in fever supposed to be caused by deranged air and bile, that is, remittent fever with gastric irritability, nervousness, etc.

(6) If the decoction of *Mutha* and *Khetpapra* are taken in doses of 2 oz., it will cure dysentery.

OXALIS CORNICULATA.

=चाङ्गेरी=

(N.O. GERANIACEÆ)

Vern.—*Sans.*—Amlalonika', Changeri. *Beng., Hind.*—Amruṣa'k. *Bombay.*—Ambuti, Bhui'-sarpati'. *Tam.*—Puli-ya'rai. *Tel.*—Puli-chintaku. *Eng.*—Horned wood Sorrell.

Parts Used.—The whole plant,

Habitat.—Grows in every low and damp places, particularly along the banks of brooks which are constantly wet.

Collection and Storage.—It is collected fresh and used in medicine.

Chemical Composition.—It contains acid potassium oxalate. (See appendix).

Physiological Action.—Refriegerant, antiscorbutic, appetizing and stomachic. (See appendix)

Dose :—The juice of the plant, $\frac{1}{2}$ to 1 oz ; dried plant—1 to 2 drams.

Therapeutics :—

(1) The fresh juice is used as an antidote to poisoning by dhatura.

(2) An infusion of the small leaves is given as a cooling medicine in fevers, in doses of two spoonfuls twice a day.

(3) The fresh leaves made into a curry are said to improve the appetite and digestion of dyspeptic patients.

(4) Bruised with or without water, they are formed into a poultice and applied over inflamed parts, by which means, great cold is produced, and pain and other symptoms are relieved.

(5) Prepared with hot water, the leaves make a very efficient poultice for boils.

(6) The fresh juice of the leaves is very useful for dyspeptic patients.

PAEDERIA FOETIDA.

=प्रसारणी=

(N. O. RUBIACEAE.)

Vern.—*Sans.*—Prasa'rani. *Hind.*—Gandhali. *Beng.*—Gandhabha'duli. *Mar.*—Hiranvel. *Guz.*—Gandhana.

Parts Used—The whole herb.

Habitat.—In the Central and Eastern Himalayas, Western India, Bengal and Assam.

Collection and Storage.—In winter season it should be collected for medicinal purposes. It should be kept in cool and air-light place.

Chemical Composition.—It contains a volatile oil of an offensive odour, two alkaloids viz.—*Alpha* paederine and *Beta* paederine. The plant gives off, when bruised, a marked odour of carbon disulphide.

Physiological Action.—The whole plant is alterative, antispasmodic, astringent, emollient, carminative and emetic.

Dose :—(Fresh) Juice, $\frac{1}{2}$ to 1 oz. Decoction, 2 to 4 oz.

Therapeutics :—(1) The decoction of the whole herb, with milk is boiled with मूच्छित Til oil. The prepared oil is very useful for rheumatism. *Kubja Prasari Taila* (कुब्जप्रसारणी तैल) which mainly contains this herb, is recommended by Chakradatta in rheumatism with contraction and stiffness of the joints.

(2) The leaves, boiled and made into soup, are wholesome and tonic for the sick and convalescent.

(3) The whole plant is regarded as a specific for rheumatic affections, in which it is administered both internally and externally.

(4) The juice of the leaves is considered astringent and given to children when suffering from diarrhoea: dose 1 drachm.

(5) Nursing mothers are given curries made with the leaves when their children suffer from bowel complaints.

PAPAYER SOMNIFERUM

=आफि=

(N. O.—PAPAYERACEAE)

Vern. Sans.—Ahiphena. **Beng.**—Aphim. **Hind.**—Afim. **Bomb.**—Aphim, Appo. **Tam.**—Abini. *Poppy seeds*, **Hind.**—Kashka'sh. **Bomb.**—Khaskhas. **Beng.**—Posto dāna. **Tam.**—Gashagasha. *The capsules*, **Hind, Bomb.**—Post. **Tam.**—Postakamol. **Beng.**—Posto dhenri.

Parts Used.—The inspissated juice of unripe capsule.

Habitat.—Behar produces what is known as “Patna opium”, Benares and the United provinces Produce “Benares opium” and Central and Western India and Rajputana are the sources of what is known as “Malwa opium.” Opium is also grown and produced in Nepal, Assam, Burma and Turkey.

Collection and Storage.—In the Bengali months of M'agh and Fa'lgoon, when the plant becomes mature the opium is collected and is preserved in Govt opium factories.

Chemical Composition.—It consists of (1) primary alkaloids, (a) morphine (b) codeine (c) narcotine etc (2) secondary alkaloids, (a) apomorphine (b) apocodeine (c) cotarnine etc. (3) neutral substances (4) organic acids (5) water.

Physiological Action.—The primary action of morphine the principal alkaloid, and representative of the whole series, is to depress the entire cerebrum ; in full doses, a deep dreamless sleep with suppression of voluntary movements and slowing of respiration occurs. The following actions may particularly be picked out :

1. A selective depressive action on painful sensations.
2. Depression and final paralysis of the respiratory centre.
3. Contraction of the pupils due to central action on the oculo-motor centre.
4. In small doses, induction of nausea ; in large doses vomiting;

5 Slowing of peristaltic movements of the intestines, and with its continued use, the production of chronic constipation.

6. Lessened activity of secretory glands.

It has little effect upon muscles or nerves in ordinary doses ; or upon the circulation, the heart beating at its usual rate and the blood pressure up ; there is some flushing of the vessels of the skin of the face and neck. Metabolism is affected only as the result of slowed respiration and decreased oxygenation.

Dose.—Extract of opium— $\frac{1}{2}$ gr.

Powdered opium—1 gr.

Ayurvedic preparations, whose action depends chiefly on the properties of the contained opium.

(1) *Akaradi churna* (अकारादि चूर्ण)—Take of pellitory root, ginger, seeds called *kakḥala*, saffron, long pepper, nutmeg, cloves and red sandal wood, each two tolas, opium eight tolas. Rub them together and pass the powder through a cloth. Then add sugar, equal in quantity to all the above ingredients. Dose grains 6 to 12, with honey. This medicine is used as an aphrodisiac.

(2) *Dugdhavati* (दुग्धवटी)—Take of opium and aconite, twenty four grains each, prepared iron ten grains, prepared talc twelve grains. Beat them into a mass with milk and make into four grain pills. One pill is to be given every morning with milk. The diet is restricted to milk alone, water and salt being prohibited. These are given in Diarrhoea with Anasarca.

(3) *Sambunatha rasa* (सम्भुनाथ रस)—Take of orpiment, realgar, cinnabar, white arsenic, borax, aconite and alum each, one part, mercury, sulphur and opium, each seven parts. Soak them for seven days in each of the following fluids, *namely*, juice of the leaves of *cannabis sativa*, *Vitex Negundo*, *datura* and *nim*. Make into two-grain pills. These are given with ginger juice in diarrhoea with high fever.

Therapeutics.—Opium and its preparations relieve—(1) Pain in general, no matter of what character.

(2) Renal colic.

(3) Gall stone colic.

(4) Internal haemorrhage (prevents restlessness, peristalsis, etc).

(5) In peritonitis (prevents peristalsis)

(6) Diarrhoea.—The preparation, *Dugdhavati* is used in diarrhoea with anasarca, and the preparation *Sambhunatha Rasa*, is used in diarrhoea with high fever.

(7) Asthma.

(8) Acute infections, as a diaphoretic and as a protectant to the heart, to prevent restlessness (in pneumonia).

(9) Preliminary to general anaesthesia.

(10) Diabetes (powdered opium sometimes will squeeze a diabetic sugar-free, when nothing else will.) The Amritsa'gar recommends the following preparation of opium in diabetes:—Take of camphor and musk, each one part. opium and mace each four parts. Make into two-grain pills. They are administered with the juice of betel leaves,

PHYLLANTHUS EMBLICA.

=आमलकी=

(N.O. EUPHOBACEAE.)

Vern.—*Sans.*—Amlaki, Dhatri. *Hind.*—A'nvula. *Beng.*—Amlaki. *Mar.*—Avala, Avalkathi. *Guz.*—Ambala. *Eng.*—Emblie myrobalan. *Fr.*—Emblie officinal.

Parts Used.—Fruits, Leaves.

Habitat.—Found almost in whole Bengal.

Collection and Storage.—It should be kept in dry, air-tight container.

Chemical Composition.—The pericarp of the fruit contains gallic acid, tannic acid, gum, sugar, albumen, cellulose and mineral matter ; the stone of the fruit (seed) is mostly leguminous matter containing an Endosperm—which on analysis was found to contain a fixed oil, an odorous resin. The Endosperm does not contain any alkaloid.

Physiological Action.—Fresh fruit is refrigerant, diuretic and laxative. The dried fruit is astringent and stomachic.

Dose :—The fresh juice, about one ounce ; the powdered fruits, 40 to 60 grains.

Therapeutics.—(1) The exudation from incisions made on the fresh fruits is put into the eye for acute inflammation.

(2) About 2 drachms of emblic myrobalan is recommended to be given in the form of a paste, with the addition of honey for checking menorrhagia and discharge of blood from the uterus.

(3) A paste of the fruits is applied above the pubic region in irritability of the bladder.

(4) The fresh juice of the ripe fruits is to be given with honey as a diuretic.

(5) The fruits are very useful for gonorrhoea patient.

(6) In leucorrhoea, the powdered seeds are very useful with sugar and honey.

(7) The leaves put into muddy water render it clear.

(8) The fruit is one of the ingredients in the preparation known as triphala, which is a very good medicine for skin diseases, constipation.

(9) *Dhatri lauha* (धात्री लौह)—Take of powdered emblic myrobalan, sixty four tolas, prepared iron thirty two tolas, liquorice powder sixteen tolas ; mix them together and soak in the juice of *gulancha* for seven times successively. This preparation is given in doses of twenty to thirty grains in anaemia, jaundice and dyspepsia.

PICRORHIZA KUROOA.

= कटु की =

(*N. O. SCROPHULARINÆ.*)

Vern.—*Sans.*—Katuka', Katurohini. *Hind.*, *Beng.*—Katki, Kutki. *Tam.*—Katuku-rohani. *Tel.*—Katuku-roni. *Mar.*—Bal-kadu. *Guz.*—Kutaki.

Habitat.—Alpine Himalaya, from Cashmere to Sikkim.

Parts Used.—The dried rhizome.

Collection and Storage.—To be kept in a dry air-tight place.

Chemical Composition.—Contains the bitter glucoside "Picrorrhizin" 14.96%—which yields Picrorrhizetin and glucose on hydrolysis ; other constituents are—cathartic acid 9.33, another organic acid, together with wax and gum.

Physiological Action—(1) The drug Picrorrhiza Kurooa has got a bitter principle named picrorrhizin, a glucoside mainly.

(2) Its action is due to its bitter principle.

(3) It has got no poisonous action.

(4) It increases the gastric secretion and thereby acts as a stomachic and bitter tonic.

(5) It diminishes the force of the heart beat and hence may be used in febrile cases, beneficial effect being due to the reduction of blood pressure.

(6) It has a mild laxative action due to the presence of cathartic acid.

Dose in powder—10 to 20 grains as a tonic ; 40 to 50 grains as antiperiodic. In small doses, it is digestive, bitter, dry, aperient and antiperiodic. In large doses (repeated) it is a hydragogue cathartic,

Therapeutics.—It is a favourite remedy in dyspepsia (bilious), accompanied by fever and is given daily in decoction with liquorice, raisins and neem bark. (*Chakradutta*)

Moodeen Sheriff notes that "it is a very good stomachic and very useful in almost all forms of dyspepsia and in nervous pain of the stomach and bowels."

Antiperiodic virtues are assigned to it by *Dr. Tripe* and later by *Moodeen Sheriff and Dymock*. Thus *Dymock* notes : "I can state from personal observation, that it is used successfully as antiperiodic in native practice in Bombay ; its slight laxative action, is rather beneficial than otherwise."

It is specially indicated in cases of constipation, where the bowels are costive, due to deficient secretion.

Surgeon Major D. R. Thompson notes that if a strong decoction of the drug be given 3 or 4 times a day in cases of dropsy, copious watery evacuations are discharged and the dropsical effusion is relieved. In some cases, the medicine must be continued for about a week, to bring about the desired effect.

It is prescribed as a laxative for children suffering from worms.

It is best administered with aromatics. Two drams of the powdered roots given with sugar and warm water act as a gentle aperient.

PIPER BETLE.

=ताम्रूल वल्ली=

(*N. O.* PIPERACEAE.)

Vern.—*Sans.*—Ta'm bula. *Hind.*, *Beng.*, *Guz.*, *Mar.*—Pa'n: *Tam.*—Vettilai. *Tel.*—Na'ga-valli. *Mal.*—Vetrila. *Eng.*—Betle Pepper.

Parts Used.—The leaves.

Habitat.—Cultivated in the hotter and damper parts of India for its leaves.

Collection and Storage.—Fresh leaves can be got everywhere.

Chemical Composition.—The leaves do not contain any alkaloid. The chief extractive matter are tannin bodies together with volatile aromatic principle. The leaves yield on distillation, a light aromatic and volatile oil known as betel oil and chavicol a very volatile pale essential oil. Betel oil contains terpene, betel phenol and sesquiterpene.

Physiological Action.—Stimulant, carminative, astringent, aphrodisiac and antiseptic. Chavicol is a powerful antiseptic, 5 times stronger than carbolic acid and twice as strong as eugenol. The juice is a valuable stomachic and febrifuge in drachm doses.

Dose :—The juice of the leaves, $\frac{1}{2}$ to 1 oz.

Therapeutics. *Externally.*—

(1) The stalk of the leaf smeared with oil is introduced into the rectum in the constipation and tympanitis of children, with the object of inducing the bowels to act.

(2) The leaves are applied to the temples in headache, for relieving pain and to painful and swollen glands for promoting absorption.

(3) The Pa'n leaves are used as a ready dressing for foul ulcer, as a substitute for oiled silk or gutta percha tissue.

(4) The juice of the leaves is dropped into the ear to relieve earache.

Internally.—

(1) The betel-leaf should be taken early in the morning, after meals and at bed-time ; mostly used as a masticatoxy by the people of India.

(2) It sweetens the breath, improves the voice and removes all foulness from the mouth, due to the astringent and volatile substances contained in it.

(3) It is said to be useful in diseases supposed to be caused by deranged phlegm, and its juice is much used as an adjunct to pills administered in these diseases ; that is the pills are rubbed into an emulsion with the juice of the betel leaf and licked up.

(4) The betel-oil is used in catarrhal affections, inflammations of the throat, larynx and bronchi ; it has an antiseptic action and is used in diphtheria as a gargle one drop in a teacupful of water ; the juice of four leaves may also be used similarly diluted.

PIPER CUBEDA

=कावाचिनि=

(N. O.—PIPERACEAE)

Vern. *Sans.*—Kankolaka. *Beng.*—Kabab-chini. *Hind.*—Kaba'b-chini, Kankol. *Tam.*—Va'l-inilaku. *Eng.*—Cubebs. *Fr.*—Cubebes.

Parts Used.—The fruit and the oil.

Habitat.—Java and the Spice Islands.

Collection and Storage.—The fruit is gathered when immature. The mature fruit which is sometimes met with in the Indian bazars should be rejected.

Chemical Composition.—Contains a volatile oil, 5 to 15 p. c. ; an oleo-resin, *cubebin* and *cubebic acid*; a little piperin; a gum, and the malates of magnesium and calcium. Oil cubeb is obtained by the distillation of cubeb with water, which deposits upon standing, rhombic crystals of hydrate of cubebene. It has an aromatic camphoraceous odour. It contains cubeb camphor, two oils, and a small amount of terpene.

Physiological Action.—Externally when applied to the skin, cubeb acts as an irritant and rubefacient. Internally, small doses of cubeb improve digestion and increase the appetite, while large doses cause gastric and sometimes intestinal irritation, with nausea, vomiting, abdominal pain, and sometimes diarrhoea. The chief action of cubeb is upon the mucous membrane of the genito-urinary tract, acting as a stimulant and disinfectant; by stimulating the functional activity of the kidney it is also a diuretic. Albumin, or blood or both may be found in the urine after large doses of the drug have been taken, owing to the severe renal irritation produced. Sometimes a papular or erythematous rash is caused, which disappears in a few days after the administration of the drug is stopped, and is followed by desquamation. Cubeb is said to increase the force and frequency of the heart. It is eliminated by the kidneys, lungs and skin.

Dose.—Powder, 15 grains, oleoresin, 7½ grains, oil, 8 minims.

Therapeutics.—(1) Cubeb is used in the treatment of genito-urinary diseases, particularly gonorrhoea.

(2) It is used in chronic cystitis.

(3) It relieves irritability of the bladder.

(4) It checks nocturnal incontinence of urine.

(5) The oil is used in the treatment of leucorrhoea.

(6) In acute rhinitis, the powder is used by snuffing up the nostril.

(7) Cubeb cigarettes often relieve an attack of asthma, hay fever.

PIPER LONGUM

= पिपल्ली =

(N. O.—PIPERACEÆ.)

Vern. Sans.—Pippali, kana, Krishna'. **Beng.**—Pipul. **Hind.**—Pipal. **Tam.**—Tippili. **Tel.**—Pippallu. The root. **Hind.**—Pippali-mu'l. **Tam.**—Tippili-mulam. **Tel.**—Modi, Pippali-katta. **Beng.**—Pipuli-mu'l.

Parts Used.—The fruit and root.

Habitat.—Hotter provinces of India.

Collection and Storage.—When the inflorescence is full-grown, it is gathered and daily exposed to the Sun, till perfectly dry, after which it is packed in bags for sale. The roots and thickest part of the creeping stem, when cut into small pieces and dried, are sold under the name of Pippali-muli.

Chemical Composition.—Resin, Volatile oil, starch, gum, fatty oil, inorganic matter and an alkaloid, *piperine* 1 to 2 p.c.

Physiological Action.—Stimulant, carminative and alterative tonic, more powerful than black pepper, also aphrodisiac, diuretic, vermifuge and emmenagogue. Externally rubefacient, resolvent and lactagogue. The root is stimulant. Old long pepper is said to be more efficacious than the fresh article.

Dose.—of powder 10 to 15 grains in honey.

Therapeutics.—*Externally.*—

(1) It is used in sciatica and paralysis as a liniment, being boiled with ginger, mustard oil, buttermilk and curds.

(2) The roasted inflorescences are beaten up with honey and given in rheumatism.

(3) *Ashtakātvara taila* (अष्टकटवर तैल)—Take of ginger and long pepper each sixteen tolas, mustard oil four seers, buttermilk thirty two seers, curdled milk four seers and boil them together. This oil is rubbed externally in sciatica and paraplegia.

(4) A paste of *Coleus aromaticus* (पाथरकुचि) with long pepper, is applied to the breasts as a lactagogue.

(5) The composition, consisting of blackpepper, long pepper seeds of *Moringa pterygosperma* (*sveta maricha*) and ginger equal parts is used as a snuff in coma and drowsiness.

Internally.—

(1) Powdered long pepper, administered with honey, is said to relieve cough, asthma, hoarseness, hiccup and sleeplessness.

(2) A mixture of long pepper, long pepper root, black pepper and ginger in equal parts, is useful for catarrh and hoarseness.

(3) Long pepper with treacle (2 parts treacle, 1 part long pepper powder.) is useful in chronic fever, indigestion, cough, loss of appetite, asthma, heart disease, jaundice and worms.

(4) In enlargement of spleen and ascites, long pepper powder is taken with milk.

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PIPER NIGRUM.

=मरिच=

(*N. O.*—PIPLRACÆ.)

Vern. Sans—Maricha, Ushana. **Hind.**—Mirach, Ka'li Mirach. **Beng.**—Gol marich. **Tam.**—Milagu. **Tcl.**—Miriya'lu. **Guz.**—Kalo miri.

Parts Used.—The fruit.

Habitat.—This perennial, climbing shrub was indigenous to Malabar and Travancore coasts ; now it grows all over India.

Collection and Storage.—The creeping plant or vine flower in May and the berries are plucked in December, when just beginning to ripen ;—the branches are plucked when the berries are changing colour from green. These are boiled in water for a few minute to soften the husk, which are then removed by rubbing over a bamboo basket. This constitutes the white pepper i.e. pepper with the black shell removed. The ordinary black pepper, is obtained by keeping the berries heaped up for a few days when all the green ones change colour and the pulp of all is more or less smashed. These are then spread out and dried. The skin and part of the pulp, adhere as a dark wrinkled covering to the stones and the pepper is black in appearance.—It should then be stored in a dry place.

Chemical Composition.—A volatile alkaloid *Piperine*, *Piperidine*, a balsamic volatile oil, fat 7 p. c. Mesocarp contains *Chavicin*, a balsamic volatile oil, starch, lignin, gum, fat 1 p. c., proteids 7 p. c. and ash containing organic matter. Chavicin is a soluble pungent concrete resin ; it contains very little piperine and no volatile oil. Piperine crystallizes in flat, four-sided glassy prisms, insoluble in water.

Physiological Action.—Carminative, antiperiodic. Externally, it is rubefacient, stimulant to the skin, and resolvent. On the mucous membrane of the urethra, it acts like cubebs. Piperine is a mild antipyretic and antiperiodic.

Dose:—5 to 20 grains.

Therapeutics.—*Externally.*

(1) In toothache, a paste of black pepper with water is applied.

(2) Strong friction with pepper, onions, and salt is said to make the hair grow again upon the bald patches left by ringworm of the scalp.

Internally.—

(1) With honey it is useful in coughs and colds.

(2) In some cases of refractory intermittent fever, in which,

after the failure of quinine, piperine has been administered with advantage. Dr. C. S. Taylor (Brit. Med. Journ., Sept., 1886).

(3) In intermittent fever, in black fever, in dose of about a drachm is recommended to be given with the juice of the leaves of *Ocimum sanctum* (tulasi), or *Leucas linifolia* (*dronapushpi*).

(4) *Pranada Gudika* (प्राणदा गुड़िका)—Take of black pepper thirty-two tolas, ginger-twenty four tolas, long pepper sixteen tola's, *Piper chaba* (*Chavya*) eight tola's, leaves of *Abies webbiana* (*ta'lisha*) eight tolas, flowers of *Mesuaferrea* (*nagakhesara*) four tolas, long pepper root sixteen tola's, leaves called *tejapatra* and cinnamon one tola each, cardamoms and the root of *Andropogon muricatus* (*Usira*) two tola's each, old treacle two hundred and forty tola's ; rub them together. When there is costiveness and a sense of heat, chebulic myrobalan is substituted for the ginger in the above prescription.

Dose.—about two drachms. This confection is given in haemorrhoids.

(6) Like cubebs, it is given in gonorrhoea, gleet and haemorrhoids and other rectal disorders.

(7) In dysentery, powder of black pepper with water is taken.

(8) If indigestion is due to taking *ghee* or things cooked with *ghee*, it is relieved by taking black pepper powder.

(9) Infantile dropsy is relieved by taking black pepper with butter.

(10) If some black-pepper is burned and held near the nostril of a hysteria patient, her hysteric fit will go away promptly. Spasms of hiccoup cease, after deep inhalation of the fumes of black pepper by the nostrils.

(11) The use of a dozen black-peppers with a teaspoonful of pure *ghee* has a tonic action on uterine musculature if given morning and evening after delivery, for about a week (R.C. Ray.)

PLANTAGO ISPAGULA.

=ईषद्गोल=

(*N O.*—*PLANTA GINFÆ*)

Vern. Sans.—Sringdhajeera. *Hind.*—Isbaghol. *Mar.*—Esabgol
Beng.—Ishabgool. *Guz.*—Esopgol. *Tam.*—Ishappukol-virai.
Tel.—Isapaga'la vittulu. *Eng.*—Spogel seeds.

Parts Used.—The seeds.

Habitat.—This is found growing in the plains of the Punjab and Sind and in the low hills from the Sutlej westward ; it is also cultivated to a small extent in different parts of India such as Bengal, Mysore and Coromandel coast.

Collection and Storage.—The seeds or the seperated dried flakes, should be well dried and kept in air-tight containers.

Chemical Composition.—Mucilage is so abundantly yielded by the seeds that one part of them with 20 parts of water forms a thick tasteless jelly. On addition of a large quantity of water and filtering, little mucilage passes, the majority adhering to the seeds. The mucilage, seperated by straining with pressure, does not redden litmus, is not affected by iodine, nor precipitated by borax, alcohol or ferric chloride (*Pharmacographia*) ; a fatty oil and albuminous matter (glucoside) also exist in the seeds. It is only sparingly soluble in water.

Physiological Action.—The seeds are demulcent ; when they are swallowed whole, in their passage through the intestines, they absorb as much fluid as makes them swell and by the time they reach the central and lower portion of the canal, they give out a bland mucilage and in general they possess the mucilaginous properties. If the bowels be made confined by an astringent enema and by using a small quantity of food, the mucilaginous properties of the seeds are most evident. The efficiency of the drug would appear to be entirely due to its large quantities of mucilage. This gelatinous substance is acted on by the digestive enzymes to a very slight extent, especially when it is on the seeds. Even after incubation for 24 hours with salivary enzymes, pepsin

and hydrochloric acid and the pancreatic enzymes, there was little digestion of the mucilage. It therefore passes through the small intestine unchanged and during its passage it lines the mucous membrane, thus acting as a demulcent and lubricant. Further, the mucilage is not acted on by the intestinal bacteria in the large gut. Its presence there exerts an inhibitory action on the growth of pathogenic organisms.

The mucilage of *Plantago Ispagula* seeds acts in very much the same way as liquid paraffin.

The roasted seeds have an astringent effect.

Dose.—Entire seeds 50 to 150 grains ; dried separated flakes 10 to 20 grains.

Therapeutics.—*Externally*—The crushed seeds made into a poultice with vinegar and oil, are applied to rheumatism and gouty swellings ; with cold water, these form a good emollient poultice. A cooling lotion for the head is prepared from the mucilage. Poultice made with these seeds are used for unhealthy ulcers, sores and sinuses. (Civil surgeon J. H. Thornton).

Internally—The seeds of *Plantago Ispagula* are very beneficial in chronic dysenteris of amoebic and bacillary origin and chronic diarrhoeas due to irritative conditions of the gastro-intestinal tract. As the seeds are cooling and demulcent, they are chiefly employed in diarrhoea, dysentery and other inflammatory and functional derangements of the digestive organs with fever.

Dr. Joubert notes : "A valuable remedy in the treatment of chronic dysentery. I have used it largely with good results and can bear personal testimony to its efficacy. I used it in spoonful doses of the whole seeds, steeped for 15 or 20 minutes in water, the resulting mucilaginous mass being swallowed. Many of the swollen seeds pass out whole with the motion and I believe their action to be mechanical as well as astringent to the intestinal ulcers. I have used it largely for dysentery and chronic diarrhoea, in both Europeans and natives and consider it a very valuable medicine."

A decoction of the seeds is prescribed in cases of cough and cold. The mucilage forms a demulcent and soothing drink

in gonorrhoea, removes the heat and scalding during micturition (most efficacious when taken as sherbat with sugar-candy)

It is also diuretic and useful as an internal remedy for piles.

2 to 3 drams of the seeds moistened with hot water and mixed with sugar-candy, are given in dysentery and irritation of the bowels.

The roasted seeds having a mildly astringent action are useful in irritation of the bowels of children and in dysentery.

Fleming, Twining, Ainslie and others speak very favourably of the use of Ispaghul in the treatment of chronic diarrhoea. *Twining* gives the dose for an adult as $2\frac{1}{2}$ drachms mixed with half a dram of sugar-candy. For gonorrhoea, a drachm of the powdered Ispaghul seeds with 10 grains of potassium nitrate and 15 grains of cubeb powder is a nice remedy (Bird wood).

The seeds were recently tested in Madras ; "they were given in the form of an infusion in cases of specific urethritis and found to relieve considerably the burning and irritation accompanying the disease."—(Report on Indigenous Drugs, Madras).

PLUMBAGO ZEYLANICA.

=चित्रक=

(*N. O. PLUMBAGINÆ*).

Vern.—*Sans.*—Chitraka. *Hind.*—Chitrak, Chita. *Guz.*—Chitra. *Mar.*—Chitraka. *Beng.*—Chita. *Tam.*—Chittira. *Tel.*—Chitra, Agnimata.

Parts Used.—The roots and the leaves.

Habitat—This plant grows wild in Bengal, Southern India and Ceylon.

Collection and Storage.—Fresh roots contain much more active principle than roots, which have been stored for a long time. This is due to oxidation of the active principle during storage. (A.C. & S.B. Dutta)

Chemical Composition.—The active principle of the plant is "*Plumbagin*," which can be obtained up to 9% to 1%. The bigger the plants, the drier the soil, the greater is the content of *Plumbagin*.

Physiological Action.—Locally, it is a vesicant. Internally alterative, and gastric stimulant. The root is said to increase the digestive power and promote appetite. (See Appendix).

Dose.—2 to 10 grains. In higher doses, it acts as a poison.

Therapeutics.—(1) The root reduced to a paste is applied to abscesses with the object of opening them.

(2) A paste of the root is used to rheumatic joints. It should be removed after 15 to 20 minutes. Locally as a vesicant, the root causes more pains than the ordinary blisters and the vesication does not heal readily.

(3) The root is put into os uteri to cause abortion.

Internally

(1) It is used as a stimulant adjunct to other preparations, in the form of a combination, called *Trimada* consisting of plumbago root, *ba'berang* seeds and the tubers of *cyperus rotundus* (*mustaka*).

Dose—10 to 15 grains useful as an alterative in rheumatism.

(2) Take of plumbago root, rock salt, chebulic myrobalan and long pepper, equal parts ; powder and mix. Dose, about forty grains. This composition is useful for dyspepsia.

(3) *Shaddharana yoga* (षडधरण योग)—It consists of equal parts of plumbago root, *indrayava seeds*, root of *Stephania hernandifolia* (*pa'tha'*), of *Picrorrhiza Kurroa* (*kātuḳi*), atis and chebulic myrobalan. Dose, about a drachm. It is a good medicine for flatulence.

(4) Its root has a beneficial influence on piles. An earthen pot is lined in its interior with a paste of the root and curdled milk (*dadhi*) is prepared in this pot, and taken by persons affected with haemorrhoids and prurigo.

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PONGAMIA GLABRA.

=करञ्ज=

(*N. O. LEGUMINOSAE*).

Vern. Sans.—Karanja, Nactama'la. **Hind.**—Karanj, Kirama'l. **Beng.**—Dahar-karanja. **Mar.**—Karanja. **Tam.**—Pungam-maram. **Tel.**—Ranaga, Kanuga-chettu.

Parts Used.—The bark, root-bark, seeds and leaves.

Habitat.—This tree is common all over India.

Collection & Storage.—It is collected during July & August.

Chemical Composition.—The seeds contain bitter and pale sherry coloured oil 27 p. c. known as Pongamia oil or *Honge* oil. The bark contains a bitter resin, mucilage, sugar, but no tannin.

Physiological Action.—The oil expressed from the seeds has antiseptic and stimulant healing properties. The leaves are stimulant, carminative and alterative. The juice of the root is demulcent and cooling. The bark is astringent. The seeds, leaves, root and oil are parasitocides ; they destroy both vegetable and animal parasites in skin diseases.

Dose:—of root-bark, 10 grains.

Therapeutics.—*Externally,*—

(1) The seeds are used as an external application in skin diseases.

(2) A poultice of the leaves is applied to ulcers infested with worms.

(3) The seeds of *Pongamia glabra*, *Cassia Tora* (*Chakramarda*), and the root of *Aplotaxis auriculata* (*kushtha*), are rubbed into a paste with cow's urine, and applied to eruptive skin diseases.

(4) The oil is used as an embrocation in rheumatism.

(5) The juice of the roots is used for cleaning foul ulcers and closing fistulous sores.

(6) For destroying worms in sores, the juice of the karanj, nim and nirgondi (*vitex negundo*), mixed together is used.

(7) A decoction of the leaves is used for medicated baths and fomentations in cases of rheumatic pains.

(8) *Prithisara taila* (पृथ्वीसार तैल)—Take of the expressed oil of the seeds *Pongamia glabra* one seer, *kanjika* eight tolas, roots of *Plumbago Zeylanica* (*chitraka*), *Nerium odorum* (*karavira*) *Vitex Negundo* (*nirgundi*) aconite and the seeds of *Corchorus olitorius* (*nadika*), eight tolas each, in the form of a paste with *Kanjika*. Mix them together and warm in the Sun. This oil is very useful in various sorts of skin diseases.

Internally.—

(1) The fresh bark is used internally in bleeding piles.

(2) In leprosy, the leaves of the Karanja and chitrak, mixed with pepper and salt, are powdered and given with curds.

(3) The juice of the root is used in gonorrhoea. *Dr. P. S. Moolhooswamy* mentions the use of the root with cocoanut milk and lime water as a remedy for gonorrhoea and of the leaves in flatulency, dyspepsia and diarrhoea. He has noticed the use of the flowers a remedy for diabetes, and of the pods worn round the neck as a protective against whooping cough. (*Indian Med. Gaz.* 1888).

PREMNA INTEGRIFOLIA

= गनियारी =

(N.O. VERBENACEAE)

Vern. *Sans.*—Agni-mantha. *Hind.*—Arani, Ganiari. *Beng.*—Ganiari. *Tam.*—Munni. *Tel.*—Pinna-nelli. *Mar.*—Arani. *Guz.*—Mothi-arani.

Parts Used.—The leaves and the root.

Habitat—On coasts of India and Ceylon.

Collection and Storage.—Should be kept in a dry place ; the roots cut into pieces and well dried.

Chemical Composition.—By analysis as done in our Laboratory :—The drug contains a volatile alkaloid to the extent of 0.05%. It also contains some resins, soluble in alcohol.

Physiological Action.—Stomachic, carminative, alterative and tonic. (See Appendix).

Dose.—The decoction of the root, 1 to 2 ozs.

Therapeutics.—(1) The infusion of the leaves (1 in 10) is used in eruptive fevers, colic, and flatulence in doses of 1 to 2 ozs.

(2) The decoction of the root (1 in 10) is given in gonorrhoea and during convalescence from fevers ; also in rheumatism and neuralgia.

(3) The root forms an ingredient of *dasamula* and thus used in a variety of affections.

(4) **Ainslie** States that the root is prescribed in decoction as a gentle cardiac and stomachic in fever.

(5) **Atkinson** states that the leaves rubbed with pepper are administered in colds and fevers, and that externally a decoction of the whole plant is used in rheumatism and neuralgia.

PSORALIA CORYLIFOLIA.

=बुचकी=

(N. O.—LEGUMINOSÆ)

Vern.—*Sans.*—Vakuchi. *Hind.*—Bukchi, Ba'bachī. *Mar.*—Bavachi. *Beng.*—Latakasturi. Buchki-dana *Tam.*—Karpō-karishi. *Tel.*—Bhavanchi-vittulu.

Parts Used.—The seeds.

Habitat.—Throughout the whole length and breadth of the plains of India.

Collection and Storage.—It should be kept in a dry air-tight container.

Chemical Composition.—The report of chemical analysis done in the Calcutta Tropical School:—The seeds contain (1) an unsaponifiable oil having the formula $C_{17}H_{24}O$ boiling between 180° and $190^{\circ}C$, at 11 to 15mm. (2) a yellow acid substance $C_{40}H_{45}O_{10}$ from alcoholic extract. (3) A methyl glucoside having melting point of 105° to $107^{\circ}C$. containing four (OH) groups. The active principle of the seeds of *Psoralia corylifolia* (babchi) is an essential oil. A fixed oil and a resin occur in large quantities; but these are not pharmacologically active substances. Traces of a substance of alkaloidal nature are also present.

Physiological Action.—Alterative nervine tonic, laxative, aphrodisiac and stimulant. Externally the oil has an irritant effect on the skin and mucous membrane. The essential oil shows a selective activity against the skin streptococci. It has a specific effect on the arterioles of the sub-capillary plexuses; these it dilates so that in this area plasma is increased. The skin becomes red, the melanoblasts are stimulated leading to pigment formation. This pigment exuded and diffuses into the decolourised leucodermic patches.

Dose:—Powder of the seeds, 5 to 20 grains.

Therapeutics.—(1) The oleo-resinous extract made from the seeds is an excellent remedy for leucoderma. The oil is

applied locally to leucodermic patches by gentle rubbing once or twice daily. It is beneficial in the treatment of cases of leucoderma of non-syphilitic origin.

(2) The Hindu physicians give the powdered *babchi* seeds by the mouth ; the beneficial effects may be due to—(a) absorption and excretion of the oil through the skin when it produces its specific action, (b) The stimulant action on the intestinal mucosa which may cause increased absorption of amino-acids concerned in pigment formation, or (c) antiseptic actions in the gastro-intestinal tract.

The observations of Col R. N. Chopra and N. R. Chatterjee show that the effect of essential oil is purely local and therefore any existing concurrent affections of the gut such as infection with *E. Histolytica* should be treated at the same time.

—O—

PTYCHOTIS AJOWAN

= यमानी =

(*N. O. UMBELLIFERAE*)

Vern. Sans.—Yamani. *Beng.*—Jowan. *Hind.*—Ajowan. *Eng.*—Bishop'weed. *Ger.*—Indisches Faltenohr. *Tel.*—Omamu *Tam.*—Omaum.

Parts Used.—The fruit.

Habitat.—This plant is largely cultivated in Eastern India.

Collection and Storage.—This should be kept in a dry, air-tight container.

Chemical Composition.—An aromatic volatile oil and a crystalline substance—stearoptin, which collects on the surface of the distilled water ; also cumene and terpene "thymene". The stearoptin known as *ajwan-ka-phul*, (flowers of ajowan camphor) is identical with English thymol contained in *Thymus Vulgaris*.

Physiological Action.—Diffusible stimulant, stomachic, carminative, antispasmodic and antiseptic. It checks chronic

discharges such as profuse expectoration in bronchitis. The oil produces a *feeling* of warmth and exhilaration and relieves the sinking and fainting feelings which accompany bowel disorders.

Dose.—Powder, 10 to 40 grains, oil, $\frac{1}{2}$ to 3 ms.

Therapeutics—(1) Ajowan, is chewed with *pan*, or taken with salt for indigestion.

(2) *Ajowan*, taken daily with treacle, is said to cure urticaria within a week.

(3) Chakradutta recommends the compound powder consisting of *ajowan*, rock salt, sonchal salt, *yavakṣh'ara*, assafoetida, and chebulic myrobalan, equal parts, in cases of colic or pain in the bowel. Dose, grains ten to twenty, to be taken with wine.

(4) Oil is used as an antiseptic in typhoid fever.

(5) The oil is applied externally to relieve rheumatic and neuralgic pains.

(6) Aqua Ptychotis is used to disguise the taste of nauseous drugs, esp. castor oil and to obviate their tendency to cause nausea and griping.

(7) *Ajowan* is said to be good for ankylostoma; it is taken with rock salt in empty stomach early in the morning.

(8) *Aqua Ptychotis* is used for acidity, dyspepsia, flatulence etc.

—O—

RANDIA DUMETORUM.

=मदन=

(*N. O.*, RUBIACEAE.)

Vern. Sans.—Madana. *Beng.*—Menphal, Madan-phal. *Hind*—Mainphal. *Guz.*—Mindhal. *Mar.*—Gela. *Tam.*—Maruk-kallan-kai.

Parts Used.—The bark and fruit.

Habitat.—A small thorny tree common in waste places.

Collection and Storage.—It should be kept in a cool, dry place and in air-tight container.

Chemical Composition.—An active principle, saponin, valerianic acid ; also wax, resin and colouring matter are found to be present.

Physiological Action.—The *fruits* is the best and the safest of emetics. The dry pulp is emetic ; emesis is promoted by a drink containing bitters and aromatics. The dry pulp is a good substitute for Ipecacuanha in dysentery. The fruit is a nervine calmative and antispasmodic as it contains valerianic acid. The thick and hard *seeds* are not emetic but they are cathartic and anthelmintic.

Dose.—Of the pulp, 15 to 60 grains as an emetic ; 15 to 30 grains in dysentery, Tincture (ethereal tincture 1 in 5).—**Dose.**—15 to 60 ms. used as a nervine calmative.

Therapeutics.—(1) It is externally applied as an anodyne in rheumatism,

(2) In colic, the fruit is rubbed to paste with rice water and applied over the navel.

(3) It is used to poison fish in water.

(4) The bark is used in the form of a paste to disperse abscesses.

(5) Powdered pulp is used in dysentery, fever (ague), headache, in combination with aromatics in doses of 15 to 30 grains,

(6) The thick shell and hard seeds are used to remove biliousness and worms in children.

(7) The tincture is used in whooping cough and mania.

(8) *Pancha Kasha'ya* (पञ्च कषाय)—Take of *Adhatoda Vasica* (*Va'saka*), *Acorus Calamus* (*Vacha'*), *nim* bark, leaves of *Trichosanthes dioica* (*patala*), and bark of *Aglaria Roxburghiana* (*priyangu*), equal parts, half a seer in all, water eight seers ; boil them together till reduced to one-fourth. This decoction is given with the addition of the pulp of *Randia dumetorum* and honey for causing emesis.

RAUWOLFIA SERPENTINA.

==चान्दर==

(*N. O.* APOCYNACEAE.)

Vern. *Hind*—Chota-chand. *Beng.*—Chandra. *Mar*—Harkai. *Tel.*—Pa'tala-gandhi. *Mal.*—Chuvanna-avilpori. *Tam.*—Convannamilpori. *Can.*—Sutranabhi.

Habitat.—Throughout India especially in Beher and Nepal

Parts Used.—The Root.

Collection and Storage.—The roots should be kept in a dry place, well dried ; if kept in a moist place, the drug deteriorates with formation of black dots inside the substance.

History of the Drug.—

Rauwolfia Serpentina is a drug of rare merit. It is unknown to the west though Roxburgh, Dymock, and Hooper mentioned it half a century ago. In the East, the drug is not considered officinal to the Ayurvedic Pharmacopoea—at least it has not been clearly identified as such. The names "*Chandrika*" and "*Sarpa-gandha*"—quoted by some authors as the Ayurvedic names for it—are mis-nomers. No drug named as above and having similar properties as *Rauwolfia* can be found in any of the "Nighantus" of Ayurvedic literature,

In the *Pharmacographia Indica* it is mentioned that the Hindus use the root as a febrifuge and as an antidote to bites of poisonous reptiles, also in dysentery and other painful affections of the intestinal canal. By some, it is supposed to cause uterine contraction and promote expulsion of the foetus.

In the *Pharmacopoea Indica*—its use in labours to increase uterine contractions, is noticed upon the authority of Dr. Pulin Addy. In Bombay, the Concan labourers, keep handy a small supply of the root, which they value as a remedy in painful affections of the bowels.

Late Kaviraj Doorga Narayan Sen Sashtri described this Drug as Cha'ndor—in Bengali, in *Sahitya Parisad Patrika* Vol. No. 20, 1320 B. S. Page 23 to 25, and described it as a drug with bitter

taste, hypnotic and depressant, having power specially to depress mental and bodily activities and therefore of use in cases of Insanity.

Mahamohopadhyaya Kaviraj Gananath Sen made a full clinical study of the use of the drug and has published his researches and findings in the Indian Medical World July 1931 and has given the indications for use of the drug in cases of Insanity and its use in cases of High blood-pressure which fact was noticed first by him.

Chemical Composition.—The drug has been exhaustively studied (see appendix) ; it contains an unnamed alkaloid about 1 %, with resins, starches, gums and salts. The salts consist mostly of Potassium Carbonate, Phosphate and Silicates with traces of Manganese and Calcium. The drug does not contain any tannin bodies.

Physiological Action.—It is intensely bitter ; the alkaloid has got depressant action on the heart and it decreases the tone of the peripheral vessels, which is the main factor in producing the fall of blood pressure.

The alkaloids also produce immediate and definite relaxation of the intestines. (For details, see Appendix.)

The alkaloid produces contraction of the multiparous or pregnant uterus, but on virgin uterus it produces relaxation.

The resins have got no effect on the blood-pressure or respiration nor has it got any depressant action on the cardiac muscles. It stimulates the uterus of virgin animals.

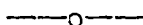
Dose—15 to 20 grains as Hypnotic, once or repeated three or four times daily in cases of violent Insanity ; in high blood-pressure 5 grains once or twice daily as decided by the physician.

Therapeutics—All the indigenous secret or patent remedies, that are sold for *Insanity*, are mostly made up of *Rauwolfia Serpentina*—and its principle use all over the country, is in cases of Insanity. Mahamohopadhyaya Kaviraj Gananath Sen observes that it is useful in the violent or manical form with high blood-pressure. In cases of asthenic demented and depressant varieties of Insanity, it often does more harm than good and so it should be used in violent, manical and sthenic forms of Insanity, average dose being

15 to 20 grains. This produces calm refreshing sleep, after which, the patient readily takes his nourishment ; after which, the medicine should be continued in suitable dose for one week to 10 days, when more lasting signs of abatement of the violent symptoms take place.

In *high blood-pressure*—5 grains twice daily is quite sufficient with regulation of diet and mode of living. We have known cases, who are in quite good health for 3 years, since they took this medicine off and on recording varying degrees of their blood-pressure.

As this drug, is one of rare merit, further investigations and researches on the Chemical Composition, Physiological action and Therapeutic uses are needed and we invite the research workers' attention to this active medicament.



RHUS SUCCEDANEA

= कर्कटशृङ्गी =

(*N. O.*—ANACARDIACEÆ.)

Vern. Sans.—Karkatasringi. **Beng.**—Kakra-sringi. **Hind.**—Kakar-singi. **Mar.**—Guz.—Ka'krasingi. **Tam.**—Ka'kkata-shingi. **Tel.**—Ka'kara-shingi.

Parts Used—The galls.

Habitat.—A small deciduous tree of the Himalaya, from Jhelum to Assam.

Collection and Storage.—The horn-like galls caused by insects on the branches and young shoots are sold in the bazar. They should be kept in dry, air-tight container.

Chemical Composition—The drug does not contain any alkaloid. It contains a lot of tannins, some resin and a volatile, odorous principle. It does not contain any glucoside.

Physiological Action.—Astringent, tonic, expectorant and stimulant.

Dose.—About 20 grains, combined with demulcents and aromatics.

Therapeutics.—

(1) Take of *karkatasringi*, root of *clerodendron Siphonanthus* (*brahmayashti*), raisins, ginger, long pepper and *Curcuma Zedo-aria* (*sati*), equal parts, powder and mix.

Dose.—About 30 grains with treacle or honey.

Indication.—In dry cough. (Chakradutta)

(2) In catarrhal fever with difficult breathing, a powder composed of equal parts of *karkatasringi*, bark of *Myrica sapida* (*kalphala*), and long pepper is recommended to be given in doses of about a drachm, with honey. (Bha'baprokash)

(3) *Sringyadi Churna* (शृङ्गादि चूर्ण)—Take of *karkatasringi*, *alis*, and long pepper, equal parts, powder and make into a linctus with honey.

Indications.—Cough linctus for children.

(4) It is used in cough, phthisis, asthma, fever, want of appetite and irritability of stomach.

(5) Mahometan writers describe it to be useful in chronic pulmonary affections, especially those of children also in dyspeptic vomiting and diarrhoea : they notice their use in fever and want of appetite.

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RICINUS COMMUNIS

= एरण्ड =

(*N. O.*—EUPHORBIACEÆ.)

Vern. Sans.—Eranda, Ruvuka. **Hind.**—Arandi. **Mar.**—Erandi. **Beng.**—Bharenda. **Tam.**—Amanakkam-chedi. **Tel.**—Amudapu-chettu. **Eng**—Castor plant.

Parts Used.—The oil, leaves, roots and seeds.

Habitat.—In India, chiefly cultivated in Bengal, Madras and Bombay.

Collection and Storage.—The seeds and roots are collected when the seeds are ripe. The oil is expressed from the seeds.

Chemical Composition.—Fixed oil 45 p.c., an inert alkaloid, ricinin, proteids 20 p.c.; starch, mucilage, sugar, ash 10 p.c., also a poisonous albuminoid principle called ricin.

The oil contains ricinolein, a mixture of glycerides of *ricinoleic* and *isoricinoleic acids*.—A viscid oil, believed to be the purgative principle.

Physiological Action—

Externally.—

The oil is non-irritating. It is said to increase the secretion of milk when applied to the breasts, but poultices of the leaves of the castor oil plant are more effectual.

Internally.—

Gastro-intestinal tract.—Its local action on the stomach is the same as on the skin, unless it is rancid, when it causes nausea, eructations and vomiting, its action being due to the formation of alkali ricinoleate as a result of saponification in the duodenum. It gently stimulates intestinal glands and peristalsis, and is a painless, speedy, certain and fairly mild purgative, operating within 4 to 6 hours. The stools are two to four in number, soft or semiliquid, but not watery; the oil being expelled with the last ones and occasionally creating griping. A portion of the oil is no doubt absorbed and when excreted by the mammary gland it may cause purgation to suckling babies. It is unsuitable in habitual constipation. The root bark is an alterative.

Dose.—The infusion of rootbark, $\frac{1}{2}$ to 1 dram; the decoction of root bark, 2 to 4 ozs. The infusion of the leaves, 2 to 4 drs., the ashes of the leaves, $\frac{1}{2}$ to 1 dr. The seeds, two; oil, 1 to 8 drs.

Therapeutics.—

(1) The leaves, boiled with the root in goat's milk and water are used as a local application in ophthalmia.

(2) A poultice of the crushed seeds is used to reduce gouty and rheumatic swellings, and inflammation of the breasts of women during lactation.

(3) The root and oil are useful in costiveness, flatulence, rheumatism, fever and inflammatory affections.

(4) The oil is much used in chronic rheumatic affections in which it is used in various combinations and for this reason, one of its synonyms is *yatari* or anti-rheumatic.

(5) The root is particularly useful in the local varieties of rheumatism such as lumbago, pleurodynia, and sciatica.

(6) As a purgative, castor oil should be taken with cow's urine, or an infusion of ginger or a decoction of the combination called *dasamula*.

(7) The seeds, freed from impurities and rubbed into a paste, are boiled in milk and water, and the decoction is given in lumbago and sciatica.

(8) In pleurodynia or pain in the sides, a decoction of the root is given with the addition of *yavakshara* (impure carbonate of potash).

(9) A poultice of the crushed seeds is used to promote suppuration, and mature boils.

(10) Hot leaves are applied to the hypogastrium to increase the flow of menses.

(11) The root bark is given in chronic visceral enlargements and chronic skin diseases,

(12) In intestinal or renal colic, the oil is given with the juice of fresh ginger with prompt relief.

(13) In cases where a foreign body has become imbedded in the eye, a few drops of castor oil is instilled into it by which pain and irritation are relieved.

(14) A few drops of castor oil is dropped into the ear, to expel insects that has entered into it.

SACCHARUM OFFICINARUM

= ३३ =

(N.O.—GRAMINEAE.)

Vern. Sans.—Ikshu. **Hind.**—Ukh, Ganna. **Beng.**—A'k.
Mar.—Us. **Guz.**—She radi. **Tam.**—Karumbu. **Tel.**—Cheruku.
Mal.—Karimpa. **Eng.**—Sugar-cane.

Parts Used.—The juice and root.

Habitat.—It is plentifully grown in India.

Collection and Storage.—Sugar-cane is collected in the month of January and February for the crushing of the canes and boiling of the juice. *Ikshu-mul* is kept in a cool, air-tight container.

Chemical Composition.—The juice contains saccharine matter, mucilage, resin, fat, albumen etc. The root contains organic salts and a trace of an alkaloid.

Physiological Action.—Preservative, demulcent, cooling, antiseptic, laxative and diuretic. Sugarcane increases the solubility of lime in water. It acts as a food and nutrient to adipose tissue ; hence sugar or sugar forming food is needed in health ; absence of it leads to rapid emaciation,

Dose :—The juice, 1 to 2 ozs.

Therapeutics.—

Externally :—(1) In epistaxis, a snuff of a juice of sugar cane is effective.

(2) It is also used as a snuff in chronic ozaena.

(3) The fumes from burnt sugar destroys offensive effluvia.

(4) For small wounds, sugar is equal to iodoform as a dressing.

(5) Sugar is very useful in opacity of cornea and granulations of eye-lids.

Internally—(1) In solution sugar is lenitive and diuretic.

(2) In powder, it is stimulant.

(3) Sugar diminishes dryness of the mouth and fauces, allays irritation and mitigates cough and hoarseness.

(4) It promotes digestion and allays nervous excitement.

(5) A strong solution of sugar is an antidote to corrosive poisons.

(6) Finely powdered sugar relieves the hiccough, which, in nursing infants, is apt to arise from over-feeding.

(7) Sweet-meats are prescribed to opium-eaters to counteract the effects of the drug.

(8) Loaf-sugar arrests the development of alcoholic intoxication, perhaps by retarding gastric absorption.

(9) As a refrigerant drink, it is given in biliousness and jaundice.

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SARACA INDICA.

=अशोक=

(N. O. LEGUMINOSÆ)

Vern. Sans.—Asoka. *Hind.*, *Beng.*—Asok. *Mar.*—Ashoka. *Tam.*—Ashogam.

Parts Used.—The bark and flowers.

Habitat.—It is cultivated in gardens throughout India.

Collection and Storage.—Bark should be collected during January and February and should be kept in a cool, dry place.

Chemical Composition.—The bark contains tannin, catechin. It contains a glucoside body but no alkaloid.

Physiological Action.—The bark is strongly astringent and uric sedative. It has a stimulating effect on the muscular fibres of the uterus (See appendix).

Dose.—1 to 2 drams, boiled in water and decoction taken.

Therapeutics.—(1) The bark is very useful in uterine affections and especially in menorrhagia.

(2) *Chakradutta* recommends the following decoction of the bark in milk in menorrhagia. It is prepared by boiling eight tola's of the bark in eight tola's of milk and thirty-two tola's of water till the latter is evaporated.

Dose.—2 or 3 divided doses during the course of the day.

(3) Dr. Waring says that it is very useful in a recurring haemorrhoidal tumour. (B. M. J. and I. M. G., 1885, P. 260).

(4) Flowers pounded and mixed with water are used in haemorrhagic dysentery.

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SANTALUM ALBUM

= चन्दन =

(N. O.—SANTALACEÆ.)

Vern. *Sans.*—Chandana, Srikhanda. *Beng.*—Chandan. *Hind.*—Sufed-Chandan. *Tam.*—Sandanak-Kattai. *Tel.*—Gandhapu-Chekka. *Eng.*—Sandal-wood.

Parts Used.—The wood and essential oil.

Habitat.—Grows abundantly in Mysore.

Collection and Storage.—To get an oil of highest quality from the sandal tree, it is necessary that the growth of the tree should be slow; consequently sandal wood grown on poor, stony soil, is though small, of far more value than that produced by large well-grown trees growing in moist situations and in richer soil.

Chemical Composition.—The wood contains volatile oil 3 to 6 p.c., a dark resin and tannic acid. The constituents of oil are (1) *Santalol*, $C_{15}H_{26}O$, a mixture of sesquiterpene alcohols with different boiling-points (94 to 98 p.c.). (2) Santalenic acid (3) Esters, free acids, etc.

Physiological Action.—The wood is bitter, cooling, sedative and astringent. The oil is astringent and disinfectant to the mucous membranes of the genito-urinary and bronchial tracts; also diuretic, expectorant and stimulant.

Dose :—Powder of the wood, 5 to 10 grains; oil, 5 to 30 ms.

Therapeutics.

Externally.—(1) Its paste made by rubbing the wood on a rough stone mortar with a little water removes prickly heat, mild local cutaneous inflammation, such as occurs after vaccination.

(2) Its paste is applied to the temples, and to the body in pains in the limbs during high fever.

Internally.—(1) Two tola's of the watery emulsion of sandal wood, with the addition of sugar, honey and rice-water, is given to check gastric irritability and dysentery, and to relieve thirst and heat of body.

(2) In cases of morbid thirst, the powder of the wood is recommended to be taken in cocoanut water.

(3) The volatile oil, is used as a remedy for gonorrhoea, in 15 to 20 ms. doses.

(4) The decoction of the wood is considered as a diaphoretic and a vascular sedative.

(5) The oil is useful in chronic or foetid bronchitis and cystitis in 10 m. doses.

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SCINDAPSUS OFFICINALIS

= गजपिप्पली =

(N. O.—AROIDEAE).

Vern. Sans.—Gajāpippalī. **Hind.**—Gaṇ-pīplī. **Beng.**—Gajapīpal. **Tam., Mal.**—Atti-tippili. **Tel.**—Enūga-pippallu.

Parts Used.—The fruit.

Habitat.—It is cultivated in Bengal, chiefly in the Midnapore district, and the fruits, cut into transverse pieces and dried, and is sold in the market as *Gaja-pīpal*.

Collection and Storage.—It should be kept in a cool, dry place.

Chemical Composition.—The fruit contains a trace of alkaloid, no tannin.

Physiological Action.—Carminative, stimulant, aromatic, diaphoretic and anthelmintic.

Dose.—5 to 10 grs.

Therapeutics.—

(1) It is useful in the form of decoction (1 in 10) in doses of 2 to 6 drachms in diarrhoea, asthma and other affections due to *Kafa*.

(2) It is used as an aromatic adjunct to other medicines.

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SEMECARPUS ANACARDIUM

= भल्लातक =

(N. O.—ANACARDIACEÆ.)

Vern.—*Sans.*—Bkallataka. Arushkara. *Hind.*, *Bēng.*—Bhe'la. *Mar.*—Bibba. *Tam.*—She'nkottai. *Guz.*—Bhilamo.

Parts Used.—Fruits.

Habitat.—It is a native of all the mountainous parts of tropical India. Flowering time—from May to August: Fruits ripen in January and February.

Collection and Storage.—Should be kept in a cool air-tight container.

Chemical Composition.—The almonds contain a small quantity of sweet oil; the pericarp contains 32% of vesicating oil, of sp. gr. 0.991, easily soluble in ether, and blackening on exposure to the air. It is similar to that of the *Anacardium Occidentale*, but Basiner found that it dissolves in potash with a green colour, and its alcoholic solution turns black with basic lead acetate. The fruit yields 2.14% of ash. (Warnecke—*Pharmacographia Indica*.)

Drs. Spiegel and Dobin have analysed the oil occurring together with anacardic acid in the pericarp of *Semicarpus Anacardium*, and found that its composition is represented by the formula $C_{32} H_{50} O_3 H_2O$.

Physiological experiments showed that the blistering action of the oil is probably due to the presence of substances dissolved in it. (*Pharm. Geselloch, 1895.*)

Physiological Action.—The juice of the pericarp and the oil are powerful escharotics. The oil is a powerful antiseptic and cholagogue. The ripe fruits are regarded as stimulant, digestive, nervine and escharotic. The marking nut is a gastrointestinal irritant when taken by the mouth. The kernel is a good nutritive food ; also appetiser, digestive and carminative. It is a good cardiac tonic, and a general respiratory stimulant. The Kavirajes correct it for purpose of internal use by rubbing the divided fruits with brick dust, in order to get rid of oil. But Dr. Hem Chandra Sen says "It is unnecessary, as I can eliminate the oil easily by straining the decoction through thick linen." The winter season is the best time to use this medicine.

Dose.—*The oil*, 1 or 2 ms. with butter or cream swallowed in a mass.

Therapeutics.—

Externally.—(1) The oil mitigated with butter or ghee (a drachm of the oil to four ounces of ghee) is used in scaly skin eruptions, e.g. psoriasis etc ; the affected part becomes softened with marked rapidity, and a normal condition returns.

Internally.—(1) In medicinal doses, the oil increases appetite and powerfully increases the secretion, the stools being tinged deep yellow in the majority of cases. Partly by its own direct stimulating action and partly by its powerful cholagogue action, it often acts as a purgative, especially in men of neurotic disposition.

(2) It has a special influence on the hæmorrhoidal veins and the lower part of the rectum. The secretion of saliva is lessened and thirst is increased.

(3) Owing to the irritant properties of oil this is invariably administered internally mixed with butter, milk or ghee.

(4) The kernel is used in the preparations of sweetmeats.

(5) As a general alterative, the kernel is often used to increase appetite. The power of digesting fats is enormously increased. It is also a powerful carminative.

(6) The fruit is a good cardiac tonic ; under its influence many, neurotic cardiac troubles are noticed to subside in a short time.

(7) The drug is a general respiratory stimulant. The condition of some cases of pneumonia improves within three or four days—an ounce of the decoction (strength—2 drachms of the bruised fruits to the ounce) once or sometimes twice a day having been used. (Dr. Hemchandra Sen)

(8) It has a decided sedative action on the cord, for it markedly relieves spasms. It is a stimulant to the sexual centres, however, and is used as an aphrodisiac.

(9) Dr. Hem Chandra Sen says.—“It has a very pronounced action in subduing all forms of neuritis. In peripheral neuritis including beri-beri, I have used the decoction with milk and ghee in gradually increasing doses with very satisfactory results.”

(10) In sciatica the drug often acts like a charm. The patients feel relieved usually within 48 hours.

(11) Dr, Hem Chandra Sen says.—Several cases of paraplegia, spastic and simple, and many others of hemiplegia have been successfully treated by me with decoction.

Contra-indication.—A bilious temperament, hæmorrhagic diathesis, pregnancy, diarrhoea, dysentery and gastritis. As it produces dysuria, it is also contraindicated in inflammatory diseases of the kidneys.

SESAMUM INDICUM

=तिल=

(N. O.—PEDALINEÆ.)

Vern. Sans.—Tila, Snehaphala. **Beng., Hind.**—Til. **Eng.**—Sesame. **Tam.**—Ellu. **Tel.**—Nuvvulu. **Guz.**—Tal.

Parts Used.—The leaves, seeds and oil.

Habitat.—This small bush is indigenous to India and extensively cultivated, in the warmer regions. Three varieties of sesamum seeds are found: black, white and red. The black variety is the most common and yields the best quality of oil and is also best suited for medicinal purposes.

Collection and Storage.—It is sown in October and November and is reaped in January and February. Oil is then expressed from them.

Chemical Composition.—Contains glycerides of olive, myristic, palmitic and stearic acids and also a resinous compound.

Physiological Action.—Emollient, nourishing, tonic, diuretic, lactagogue and emmenagogue.

Dose.—One tola.

Therapeutics.—

Externally.—(1) It is used in making the officinal liniments, ointments and plasters, for which olive oil is directed to be used.

(2) Seeds ground to a paste with water are given with butter in bleeding piles.

(3) A poultice made of the seeds is applied to ulcers.

Internally.—(1) As laxative the seeds are used in removing constipation and in piles.

(2) As a demulcent the seeds are used in dysentery.

(3) As diuretic, the seeds are given in urinary diseases.

(4) Sweet-meats made of the seeds (Til. 4 tola's and sugar 1 tola') are beneficial in bleeding piles.

(5) The following preparation is used for gonorrhoea:—**Re.**
Ol. Sesami mxx. ; Aqua calcis mxx. ; Aqua 1 oz. in mixture.

- (6) As decoction, it is emmenagogue.
 (7) The decoction of it sweetened with sugar is prescribed in cough.
 (8) The compound decoction of it with linseed is used as an aphrodisiac.
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SIDA CORDIFOLIA

=बला=

(N. O.—MALVACEÆ.)

Vern. Sans.—Bala'. Ba'tya'laka. **Beng.**—Berela. **Hind.**—Bariara. **Eng.**—Country mallow. **Tam.**—Malai-tangi. **Guz.**—Bala.

Parts Used.—Roots, leaves and seeds.

Habitat.—Grows throughout the plains of India where the climate is damp.

Collection and Storage.—Should be kept in cool, air-tight container.

Chemical Composition.—(1) Fatty oil, phytosterol etc ; (2) resin and resin acids ; (3) alkaloids. There are no glucosides or tannins. (Chopra & De.)

Physiological Action.—Cooling, astringent, stomachic, tonic, febrifuge, demulcent and diuretic. The seeds are aphrodisiac. Chopra & De attributes well marked Sympatho-mimetic action closely resembling ephedrine. (See Appendix)

Dose.—Root powder, 10 to 20 grains, decoction of root-1 to 2 ozs.

Therapeutics.—(1) Made into a paste with juice of palmyra tree, it is applied locally in elephantiasis.

(2) An infusion made from them is given in nervous and urinary diseases and also in disorders of the blood and bile.

(3) The seeds are used in gonorrhoea, cystitis and are also given for colic and tenesmus.

(4) The leaves are used in ophthalmia.

(5) The root-juice is used for healing wounds.

(6) The juice of the whole plant is also used in doses of $\frac{1}{4}$ ounce for rheumatism and spermatorrhoea.

(7) A decoction of the root and ginger is given in intermittent and other fevers attended with shivering fits.

(8) The root powder is given with milk and sugar in persons suffering from frequent micturition and leucorrhoea.

(9) In many nervous diseases, e.g. hemiplegia, facial paralysis headache, etc., the root is used by itself or in combination with asafoetida and rock salt.

(10) Useful as a cardiac tonic with irregular action of the heart. (Mahamohopadhyaya G. N. Sen.)

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SMILAX GLABRA

=चोवचिनि=

(N.O.—LILIACEAE.)

Vern. Sans.—Chobachini. **Hind.**—Chobchini. **Beng.**—Topchini. **Tam.**—Paringai-puttai. **Mal.**—China-pagu.

Parts Used.—The tuberous root.

Habitat.—A plant indigenous to China and Japan.

Collection and Storage.—Found in every bazar.

Chemical Composition.—The root contains fat, sugar, glucoside, colouring matter, gum and starch.

Physiological Action.—Diaphoretic, stimulant, alterative, anti-syphilitic, antirheumatic and aphrodisiac. It is a substitute for B. P. Sarsaparilla.

Dose.—Of the decoction (1 in 10 reduced to 5); 2 to 4 ounces.

Therapeutics.—

(1) It is used as an alterative along with *ariantamul* and other drugs of same nature in syphilis and rheumatism.

(2) The decoction of the fresh root is used for the cure of sores and venereal complaints.

(3) It is boiled in milk to which *Mastaki*, cardamoms and cinnamon are added and taken internally in rheumatism, gout, epilepsy, chronic nervous diseases, cachexia, seminal weakness and constitutional syphilis.

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SOLANUM XANTHOCARPUM

=कण्टिकारी=

(N. O.—SOLANACEÆ.)

Vern. Sans.—Kantakari, Nidigdhika'. **Hind.**—Katai. **Beng.**—Ka'ntaka'ri. **Mar.**—Bhui-ringani. **Guz.**—Patha-ringani. **Tam.**—Kandan-kattiri. **Tel.**—Va'kudu.

Parts Used.—The whole plant and the fruits.

Habitat.—Common throughout India.

Collection and Storage.—Should be kept in a cool dry place in an air-tight container.

Chemical Composition.—The fruit contains fatty acids, wax and an alkaloid. The dried leaves contain an alkaloid and an organic acid. (See Appendix)

Physiological Action.—Aperient, carminative, expectorant and diuretic. (See Appendix)

Dose.—Of Decoction, 1 to 2 ozs ; of Powder, 20 to 60 grains.

Therapeutics.—(1) A paste of the seeds is locally applied to promote suppuration of boils, buboes and other indolent, chronic abscesses.

(2) It is an ingredient of *dasamula* and is thus largely used in a great variety of diseases.

(3) Dr. W. C. Mukherjee, says,—“Kantakari is an invaluable medicine for Dropsy as a sequela of the advanced stage of Fever, when all other modes of treatment fail. It is powerful diuretic and is useful in chronic, violent as well as low fever, dropsy or general anasarca, low vitality of the general system, enlargement of liver and spleen. It is combined with kurchi in anasarca with dysentery.”

(4) A decoction of the root is given with the addition of long pepper, and honey in cough and catarrh, and with rock salt and assafoetida in spasmodic cough.

(5) As a diuretic, the decoction is given in dysuria, cystic calculi and dropsy.

(6) The root is largely employed in catarrhal and febrile affections.

(7) The juice of the fresh plant, with 2 tolas of Hemidesmus juice, is given in whey as diuretic, and the root with chiretta and ginger is given in decoction as a febrifuge.

(8) The expressed juice of the leaves is given with black pepper, in rheumatism.

(9) A decoction of the plant is used in cases of gonorrhoea.

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STEREOSPERMUM SUAVEOLENS.

= पाटला =

(*N. O.*,—BIGNONIACEAE.)

Vern. *Sans.*—Pa'tala'. *Hind.*—Paral. *Beng.*—Parul. *Mar.*—Pa'dri. *Tam.*—Pa'dri. *Tel.*—Pa'dari. *Guz.*—Pa'dri.

Parts Used.—The root-bark and flowers.

Habitat.—Throughout the moist parts of India.

Collection and Storage.—To be well dried and kept in a cool air tight container.

Chemical Composition.—The flowers contain albuminous, saccharine and mucilaginous matters and wax ; for bark. (See Appendix)

Physiological Action. Refrigerant and diuretic and tonic.

Dose.—Of Infusion of the bark (1 in 10) $\frac{1}{2}$ to 1 ounce.

Therapeutics.—(1) *Infusion of the bark* is used in dyspepsia, fever, cough & dropsy etc.

(2) The flowers with honey stop trouble-some hiccough.

(3) The flowers are taken in the form of a confection as an aphrodisiac.

(4) The root is one of the ingredients in the Dasamula.

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STRYCHNOS NUX VOMICA.

कुचिला

(N. O.—LOGANIACEAE.)

Vern. Sans.—Kupilu, kulaka, Vishamushti. *Hind, Beng.*—Kuchila. *Mar.*—K'ajra. *Tam.*—Yettie-kottai. *Tel.*—Mushidi. *Eng.*—Poison-Nut.

Parts Used.—The seeds.

Habitat.—East Indies (India, Ceylon)

Collection and Storage :—The seeds are to be well dried and kept in a dry place.

Chemical Composition :— (1) *Strychnine* 0·2 to 0·5 p.c. varying in different seeds (2) *Brucine*, 0·5 to 1 p.c. (3) *Igasuric acid*, with which strychnine and brucine are united (4) *Loganin*, a glucoside (5) *Igasurine*, another alkaloid like the other two. (6) Fat and sugar.

The wood bark and leaves contain brucine but no strychnine.

Physiological Action :—The seed is a nervine tonic, stomachic and aphrodisiac, a spinal stimulant ; also respiratory and cardiac stimulant. In excessive doses it is virulent poison producing tetanic convulsions. The bark is employed as tonic and febrifuge, *Strychnine* is stimulant to the respiratory and vasomotor centres. In minute doses it has the same therapeutic action as nux vomica but in a more powerful degree. In small doses, it stimulates the stomach and intestines, increases the gastric, the pancreatic, the intestinal and the biliary secretions. Strychnine promotes digestion, sharpens appetite, increases peristalsis and acts as a purgative. It stimulates the uterus and the genito-urinary organs, promotes menstruation. It increases the flow of urine and is often found in the urine, saliva and sweats. It is a cumulative poison.

Dr. H. C. Sen says :—“In powdered form, Nux vomica remains in the alimentary tract for a long time, and thereby exerts its influence on the digestive tract by allowing gradual absorption of its active principles and by its prolonged mild

stimulating action on the secreting cells and nervous mechanism of the alimentary tract." One of the methods of preparing nux vomica in powdered form for medicinal purposes is to boil it in milk or a mixture of equal parts of milk and water. The process of boiling in milk is said to have a mitigating effect on the nux vomica.

Dose :—of Powder 1 to 3 grains.

Therapeutics.—(1) Nux vomica seeds produce a sort of intoxication for which they are habitually taken by some as an aphrodisiac.

(2) The seeds are used in dyspepsia and diseases of the nervous system.

(3) It is used in intermittent fevers, diabetes, anaemia, chlorosis and other affections.

(5) Nux vomica is very useful in malarious fevers of a low type.

(6) Nux vomica is a valuable drug in the bronchitis of the debilitated.

(7) It is given as an adjunct to purgatives in constipation ; it increases their peristaltic effect.

(8) As a neurotic it influences the pneumogastric nerve and is useful in cough of phthisis, in bronchitis, pneumonia, emphysema, also in bronchial asthma, in cardiac or pulmonary dyspnoea, cardiac palpitation with irregular heart.

(9) Sulharanayoga (शूलहरण योग)—Take of chebulic myrobalan, long pepper, black pepper, ginger, nux vomica, assafoetida, sulphur and rock salt, equal parts and make into four-grain pills. These are given with warm water in dyspepsia with pain, after meals, and in diarrhoea.

STRYCHNOS POTATORUM.

= निर्मली =

(*N. O.*—LOGANIACEÆ.)

Vern. Sans.—Kataka, Ambuprasa'da. *Hind., Beng., Guz.*—Nirmali. *Mar.*—Katak. *Tam.*—Tetra'n-Kottai. *Tel.*—Chilla-ginjalū. *Eng.*—Clearing nut.

Parts Used.—The seeds.

Habitat.—Bengal, Central and Southern India and Burma.

Collection and Storage.—The dried seeds are to be kept in dry bottles.

Chemical Composition.—The seeds contain no strychnine ; but brucine is present.

Physiological Action.—Alterative tonic, stomachic and demulcent. It has the property of clearing muddy water. The action is due to albumen, present in the seed. It is non-poisonous. It has an emetic property also.

Dose :—Powder of the seed, 10 to 20 grains ; as emetic, 30 grains.

Therapeutics. Externally—It is chiefly used as local application in eye-diseases.

(1) The pulp of one seed, is to be rubbed into a paste and mixed with 8 oz of boiled cool water and kept one night and the clear water standing on the top, to be used as Eye-drop in cases of catarrh of the eyelids and conjunctiva.

(2) The seeds are rubbed with honey and a little camphor, the mixture applied to the eyes in lachrymation or copious watery discharge from there.

(1) **Internally**—Its infusion is recommended in irritation of the urinary organs, as gonorrhoea, diabetes.

(2) In long standing and chronic diarrhoea which resists all treatment, one half or a full seed, rubbed up into a fine paste with some butter milk and given internally for one week, is effectual (Watt's dictionary.).

SYMPLOCOS RACEMOSA.

=लोध्र=

(*N. O.*—STYRACEAE.)

Vern. Sans—Lodhra. **Hind.**—Lodh, Tilak. **Beng.**—Lodh. **Mar.**—Lodhra. **Guz.**—Lodhar. **Eng.**—The Lodh tree (bark) ; Lotur bark. **Tel.**—Ludduga-chettu.

Habitat.—Throughout North-East India, in Chota-Nagpur and the hilly tracts of Bengal and Assam.

Parts Used.—The bark.

Collection and Storage.—Should be kept in a dry place.

Chemical Composition.—It does not contain any alkaloid. The solid residue obtained from watery extract or alcoholic extract reduces Fehling's solution and is of the nature of a glucoside.

Physiological Action.—Cooling, and astringent, the fresh decoction produces contraction of the unstriated muscles, of the intestines and uterus. Lodh should be used in the raw condition, either in powder or in fresh decoction. Alcoholic extracts or watery extracts if kept for sometime deteriorate and become physiologically inert. (See Appendix.)

Dose—Of the bark-powder, 20 grains, thrice daily or more, as necessary.

Therapeutics.—(1) It is used in bowel complaints, eye-diseases and ulcers.

(2) It enters into the composition of numerous prescriptions for bowel complaints along with Bael and Kurchi bark.

(3) It is used as a gargle for giving firmness to spongy and bleeding gums.

(4) The following application round the eyes is recommended in cases of ophthalmia.—Take of lodhra bark, liquorice root, burnt alum and rusot equal parts and rub into a paste with water.

(5) In Bombay, the bark is often employed in the preparation of the plasters and is supposed to promote the maturation and resolution of stagnant tumours.

(6) Dr. T. E. Charles and Kanai Lal De. recommend the bark in 20 grain doses mixed with sugar as a medicinal agent in menorrhagia due to relaxation of the uterine tissue ; it should be given two or three times a day for 3 or 4 days. It is considered that the drug has a specific action on relaxed mucous membrane as well as on the uterine muscles (See Appendix)

(7) In Chyluria and Elephantiasis (Filarial diseases) as well as in cases of lymphangitis, the powder of the bark, has been observed to give beneficial results and as it is a harmless drug, it should be largely used in these cases.

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TAMARINDUS INDICA.

= तिमिन्दी =

(N.O —LEGUMINOSÆ.)

Vern. Sans.—Tintidi, Amlika. **Beng.**—Tentul. **Eng.**—Tamarind tree. **Hind. Guz.**—Imli, Amlī. **Mar.**—Chintz. **Tam.**—Puliyam-Pazham. **Tel.**—Chint-apandu,

Parts Used.—The pulp, leaves and seeds.

Habitat.—Found plentifully in the gardens of Bengal.

Collection and Storage.—When it ripens, the seeds are taken out of it and the pulp kept in a dry air-tight vessel.

Chemical Composition.—The pulp contains tartaric acid 5 p.c. citric acid 4 p.c., malic and acetic acid, tartrate of potassium, sugar, gum and pectin. The seed-testa contains tannin, a fixed oil and insoluble matter. The seeds contain albuminoids, fat, carbohydrate, fibre and ash containing phosphorus and nitrogen.

Physiological Action.—The unripe fruit is highly acid. The pulp of the ripe fruit is cooling, carminative, digestive and laxative ; a valuable anti-scorbutic and antibilious. The seeds are astringent. The tender leaves are cooling and anti-bilious. The red outer covering of seeds is a mild astringent. The bark is astringent and tonic.

Dose :—The decoction of the leaves, 2 to 4 ozs. ; of the ash of the bark, 5 to 20 grs.

Therapeutics Externally—(1) The pulp of the ripe fruit and the leaves, made into poultice are applied to inflammatory swellings.

(2) A gargle of tamarind water is recommended in apthous sores and sore-throat.

(3) The shells of the ripe fruit are burnt, and their ashes are used in medicine as an alkaline substance, along with other medicines of the sort, as for example in the preparation of *Abhaya lavana*.

(4) The ash obtained from the ripe fruit is used also as an alkaline medicine in acidity of urine and gonorrhoea.

(5) The oil which we get from the seed is called *Chinch Taila* (चिञ्चा तैल)

(6) Equal parts of boiled unripe tamarind fruit and *Sora* are made into a paste to be applied to any kind of swelling of the hand or foot.

Internally—(1) The ripe fruit is useful in constipation.

(2) It is also useful in intoxication from *datura* and from spirituous liquors.

(3) The pulp of the ripe fruit is used to quench thirst, in sun-stroke and in bilious vomiting,

(4) The ripe fruit is useful in diseases supposed to be caused by deranged bile such as burning of the body.

(5) The seeds are given in dysentery.

(6) The leaves, crushed with water and expressed yield an acid fluid, which is said to be useful in bilious fever, and scalding of the urine.

(7) *Amlika pana* (अम्लिका पाना)—Macerate some tamarind pulp in water; strain, and add black pepper, sugar, cloves, camphor and cardamoms to taste. This preparation is prescribed as an agreeable cooling draught in loss of appetite and disinclination for food.

(8) The decoction of the leaves of young plant is very useful for bloody dysentery. (N.N. Sen)

(9) The ashes of the dry bark of the tree is useful for colic and loss of appetite (N.N. Sen.)

TERMINALIA ARJUNA

=अर्जुन=

(N. O.—COMBRETACEAE).

Vern. Sans.—Arjuna, Kukubha. **Beng.**—Arjun. **Hind.**—Kahu. **Eng.**—The Arjuna Myrobalan. **Tel.**—Tella-maddi-chettu. **Tam.**—Vellai-maruda-maram.

Parts Used—Bark.

Habitat.—It is found in lower Himalaya, Bengal, Burma, Central and Southern India and Ceylon.

Collection and Storage.—The bark is to be collected from full grown mature tree, well dried and stored in a dry place.

Chemical Composition.—Regarding the chemical composition Dr. Lal Mohan Ghosal writes :—

The extract from the bark yields—1. Sugar 2. Tannin 3. A colouring matter, 4. A body glucosidal in nature. 5, Carbonates of calcium and sodium and traces of chlorides of alkali metals.

Father J. F. Caius & Dr. K. S. Mhaskar observe that :—An analysis of the bark of *Terminalia Arjuna* does not reveal the presence of any active principle of the nature of alkaloid, glucoside, or essential oil, with the exception of large amounts of calcium salts, tannins, organic acids, an inorganic ester and sugars, no other substances could be detected.

* Caius and Mhaskar described several varieties of the Terminalias and of which, *Terminalia Tomentosa* was found to be active and *Terminalia Arjuna*, appeared rather inert in pharmacological experiments. As it is very difficult to identify the varieties we procured the Bark commonly known as Arjuna Bark and conducted our researches and have described our findings.

We append here to extracts from the Summary and discussion (Page 74 of I. M. R., March 1931) “the pink coloured barks of *Arjuna*, *coriacea*, *pallida* *paniculata* and *tomentosa*, are generally mistaken for one another and that they are being exhibited and sold indiscriminately as “arjun.” Their apparent likeness naturally explains the confusion and scientific Pharmacognosy is the only reliable mode of determining their specific differences. * * * that our key for the identification of the dry barks of the commoner Indian species of genus *Terminalia*, will have necessarily to undergo modifications as barks of different ages and from different localities, become available for study.”

Physiological Action.—Dr. Ghosal published the 1st original observation on Arjuna in Food & Drugs, 1910, as follows :

(1) The drug (*Terminalia Arjuna*) acts as a cardiac stimulant and tonic,

(2) The blood pressure is increased, due to the contraction of the peripheral arterioles.

(3) It acts as a powerful haemostatic ; the only drawback for this action is the rise of blood pressure.

(4) It slightly increases the excretion in the amount of phosphates and uric acid, but the increase is not so material as to be taken into practical account.

The latest observations in our pharmacological laboratory are as follows.—

Chemical Composition of the drug in our own Laboratory shows the presence of a body glucosidal in nature besides tannin and a large percentage of calcium.

In view of the conflicting nature of the chemical composition of the drug obtained in the laboratories of different research workers, we decided to test the effect of the whole drug on lower animals.

But from the pharmacological experiments with the glucoside obtained from the drug, it is certain that this glucoside is not the active principle.

From the results of the perfusion of frog's heart through the the Inferior Vena Cava, it has been found that when the heart is in the normal condition, injection of the decoction of the whole drug (1 in 10) does not produce any change, except slight slowing (See fig. I) (Appendix)

But its effect on the cardiac muscles is most marked when the condition of the heart is very low (See fig. II) (Appendix)

Blood pressure in the lower animal is always raised and the effect persists for a long time, and simultaneously there is dilatation of the intestinal blood vessels (See fig. III). (Appendix)

Perfusion of the kidney vessels also shows dilatation.

Dose :—(i) of powder of the bark 20 to 40 grs.

(ii) Liq. Extract of the bark (1 in 2), non-alcoholic.
1 to 2 drams.

(iii) Infusion of the bark (1 in 10) 1 to 2 fluid ounce.

Therapeutics.—(1) The bark of *T. Arjuna* is considered throughout India as a very valuable cardiac tonic.

(2) Baghbhat was the first to prescribe the bark of “Arjuna” in heart disease. The practice was then recommended by Chakradatta and all subsequent commentators on Ayurveda.

(3) Dr. Ghosal says the following about its therapeutic action, and we are also of the same opinion :—

(a) The drug is a very valuable remedy in heart diseases, specially where a combined tonic and stimulant action is necessary. Thus, in mitral disease, specially in later stages when the heart is feeble and flaccid, blood pressure low and the heart dilated, the drug may be administered with admirable effects. In aortic diseases the drug has one defect, namely, it increases the blood pressure, and the diastole is rather prolonged but the force of contraction and the manner in which the aortic valves meet together may be utilised in those forms of aortic regurgitation that are caused merely by dilatation of the aorta, or in which the valves, although healthy, do not come into firm apposition, or in which the regurgitation is caused by weakness of the heart.

(b) In exhausting diseases weakening the heart and increasing the frequency of the pulse, the drug is invaluable, for, it does not exert any poisonous action like digitalis if long continued.

(c) The drug may be used as a good local haemostatic, but generally its use as a haemostatic is doubtful on account of the rise of the blood pressure. In inflammation locally and generally it may be used by causing the contraction of the peripheral arterioles, and increasing the diapedesis, and at the same time improving the general circulation, the drug will relieve the inflammatory condition of the part. For this reason Chakradatta recommended it for all sorts of inflammatory conditions, and he goes so far as to say that it heals fractures etc. For this reason

it may be commended in pneumonic inflammations of lung, but directly it has no action on respiratory organs.

(6) It is very efficacious for local inflammation.

(7) It is a very good diuretic.

Contraindication.—The drug should not be used in cases with high blood pressure.

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TERMINALIA BELERICA.

=बहेड़ा=

(N O.—COMBRETACEAE.)

Vern. Sans.—Vibhitaki. *Hind. Beng.*—Bahera. *Mar.*—Behada, vahela. *Tam.*—Ta'nrik-kay *Tel.*—Ta'ndra-ka'ya. *Eng.*—Beleric myrobalan.

Parts Used.—The whole fruit.

Habitat.—It is found to grow everywhere in Indian plains and sometimes under the hills.

Collection and Storage.—It should be kept in a cool, dry, place.

Chemical Composition.—The beleric myrobalans consist of gallo-tannic acid, colouring matter, resins, and a greenish yellow oil (25 p.c.)

Physiological Action.—Astringent, laxative, tonic and attenuant.

Dose :—Powder of the rind of fruit, 20 to 30 grains. The pulp, 20 to 40 grains.

Therapeutics.—(1) The dried pulp roasted is kept in the mouth as lozenges, in sorethroat.

(2) The fruit is given in diarrhoea, dropsy, piles, leprosy etc., also in enlargement of spleen and fever.

(3) As a constituent of *Triphala*, it is used in all diseases.

(4) The kernel of the fruit is said to be narcotic and astringent and is used as an external application to inflamed parts.

(5) It is used as an astringent application to eyes.

(6) When half-ripe, it is considered purgative, when fully ripe astringent. Mixed with honey, it is employed as an application in cases of ophthalmia.

(7) In hoarseness, belleric myrobalans, rock salt and long pepper, rubbed into a paste with butter milk, are recommended to be used as a linctus. (*Chakradutta*).

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TERMINALIA CHEBULA

हरितकी

(*N. O.*—COMBRETACEÆ.)

Vern. *Sans.*—Haritaki, Abhay'a, Pathy'a. *Hind.*—Harra. *Beng.*—Haritaki. *Mar.*—Hirada. *Tam.*—Kaduk-kai. *Tel.*—Karakkaya. *Eng.*—Chebulic myrobalan.

Parts Used.—The dried myrobalan.

Habitat.—This tree is wild in the forests of Northern India, the central Provinces and Bengal, common in Madras, Mysore and in the southern parts of the Bombay Presidency.

Collection and Storage ;—Kept in bags in a dry place.

Chemical Composition.—Contains gallo-tannic acid, gallic acid, resins (green and brown) and mucilage. The tannin found amounts to 20 to 20·6%, a lower percentage, than that quoted by other investigators who give an average of tannin in Myrobalans from 20 to 40%. The soft green resin is presumably the "Myrobalanin" of Dr. Apery.

Physiological Action.—It is a purgative and astringent. It purges in a different manner from cassia, manna or such like drugs, but purgation is followed by binding. It is quite possible that its action may be that of a nervomuscular stimulant, like nux vomica, Certainly the most valuable class of purgatives in the treatment

of Indian diseases. It is also stomachic, tonic and alterative. The ripe fruits are generally purgative and the unripe ones called जङ्गी हरितकी astringent and aperient.

Dose :—Powder of the fruit, 20 to 40 grains.

Therapeutics. *Externally*—(1) A fruit finely powdered, is used as dentifrice. It is said to be useful in carious teeth, bleeding and ulcerations of the gum,

(2) A fruit, coarsely powdered and smoked in a pipe, affords relief in a fit of asthma.

(3) The ashes mixed with butter form a good ointment for sores.

(4) A fine paste, obtained by rubbing the fruit on a rough stone with little water, mixed with carron oil is applied to burns and scalds ; effects a more rapid cure than when carron oil alone is used.

(5) Water in which the fruits are kept over night is considered a very cooling wash for the eyes.

(6) Haritaki contains a large amount of astringent principle and so is used as substitute for galls in lotions and injections. A decoction of them is serviceable in bleeding piles and in some vaginal discharges (*Dr. Oswald*). *Ainslie* notices their use as an application to apathæ.

Internally—(1) The fruits are used as a medicine for sore throat.

(2) The unripe fruit is used in dysentery and diarrhoea.

(3) The ripe fruit is used as purgative, removing bile and phlegm.

(4) Two or three Haritaki rubbed into a paste and taken with a little rock-salt, act as a mild laxative.

(5) Myrobalans are used in fevers, cough, asthma, urinary diseases, piles, intestinal worms, chronic diarrhoea, costiveness, flatulence, vomiting, hiccough, heart diseases, enlarged spleen and liver, ascites, skin diseases etc.

(6) The following compound decoction called *Pathy'adi kva'tha* (पथ्यादि क्वाथ) is used as a purgative.—Take of chebulic myrobalans, pulp of *Cassia fistula*, root of *Pricorrhiza kurroa*

(*Katuki*), root of *Ipomoea Turpethum* (*trivrit*) and emblic myrobalans, equal parts, in all two tola's, and prepare a decoction in the usual way. Dose, two to four ounces.

(8) As an alterative tonic for promoting strength, preventing the effects of age and prolonging life, Haritaki is used in different seasons with different anupans. One fruit is taken every morning with salt in the rainy season, with sugar in autumn, with ginger in the first half of the cold season, with long pepper in the second half, with treacle in the two hot months.

(9) Six chebulic myrobalans, bruised and given in decoction act efficiently and safely as a purgative, producing 4 or 5 copious stools, unattended by gripings, nausea and ill effects. The addition of a little cinnamon renders the medicine more palatable.

(10) *Twining (Diseases of Bengal, Vol. 1)* speaks very favourably of the immature fruit as a tonic and aperient in enlargements of the abdominal viscera.

(11) Dr. *M. P. Apley* has brought to the notice of the profession in Europe the value of this drug in dysentery and choleric diarrhoea; he administers it in pills of 25 centigrams each, dose being from 4 to 12 pills or even more in 24 hours.

(12) Numerous preparations of *haritaki* for special diseases are described in Ayurvedic books.—*Amrita haritaki* for dyspepsia, *Danti haritaki* for enlargements in the abdomen called *gulma*, *Agasti haritaki* in consumption, *Dasamuli haritaki* in anasarca etc.

Amrita haritaki (*अमृत हरितकी*)—One hundred large sized chebulic myrobalans are boiled in butter-milk, and their seeds are taken out. Four tolas each of long pepper, black pepper, ginger, cinnamon, plumbago root, root of *Piper chabba* (*chavika*), the five salts, *ajowan*, *yavakshare*, *Sarjikakshara*, borax, assafoetida and cloves, are reduced to powder, and soaked for three days respectively in a decoction of tamarind and in lemon juice. This mixture is introduced within the seedless myrobalans, which are then exposed to the sun and dried. One of these prepared myrobalans is directed to be taken every morning for the relief of various sorts of dyspepsia and indigestion.

Danti Haritaki (दन्तो हरितकी)—Take Chebulic myrobalans 25, *Dantimul* two and half seers, root of *Chita* two and half seers, water sixty four seers. Boil it down to eight seers. Boil two and half seers treacle with the decoction. Strain it and fry it with half a seer of *til oil*. Then mix with it powder of *Ipomoea turpethum* (तेउड़ि चूण) $\frac{1}{2}$ seer, *Piper longum* 4 tolas, and powder of ginger 4 tolas. When it will be turned into the consistency of a linctus, take it down. When it will be cool, add to it, honey, cinnamon, cardamom, *nageswar*. Dose of it, 2 tolas as a linctus.

Agasta Haritaki (अगस्त्य हरितकी)—Take *Dasamula* (bark of ten roots), seeds of *Mucuna pruriens*, *Pladera decussata*, *Sati*, *Sida Cordifolia*, *Scindapsus officinalis* (गजपिप्पली), *Achyranthes aspera* (अपामार्ग), *Pipul-mul*, *Plumbago Zeylanica* (चिता), *Clerodendron siphonanthus* (भागी), *Puskarmul*, each 16 tolas, *Jav*, (यव) 8 seers and chebulic myrobalans 100, and water eighty tolas. Boil it to one-fourth. Fry the boiled *Haritakis* with one seer *ghee* and one seer *til oil*. Put them into the prepared decoction. Mix with it, $12\frac{1}{2}$ seers treacle. Boil the mixture. When it will turn into a little thick consistency, mix with it *piper longum* $\frac{1}{2}$ seer. Then boil it to the consistency of a linctus. Dose, 2 tolas.

Dasamuli Haritaki (दशमूल हरितकी)—Take *Dasamula* (barks of ten roots), chebulic myrobalans 100, water sixty-four seers. Boil it to sixteen seers. Strain it and mix with it old treacle $12\frac{1}{2}$ seers. Strain it again. Boil again the prepared *Haritakis* with the strained mixture in an earthen pot. Mix with it *Trikatu* and *Yavaksha'ra* together forty tolas, cinnamon, cardamom, each two tolas. When it will be cool, add honey to it. Dose, 4 tolas.

(13) *Haritaki Khanda* (हरितकी खण्ड)—Take *Triphala*, *Mutha*, cardamom, cinnamon, *nageswar*, *Ajowan*, *trikatu*, coriander, anisi, *Sulfa*, *Lavang*, each two tolas, *Ipomoea Turpethum*, *Senna* leaves, each 16 tolas, powder of *haritaki*, 64 tolas, sugars 4 seers. Boil it in the usual way. Dose.—one tola with warm milk. It is very useful for colic due to acidity.

Contra-indications.—Easily tired, thin persons or those who are observing fast, and pregnant women etc, should not regularly use *Haritaki*.

TINOSPORA CORDIFOLIA.

=गुड़ची=

(N. O.—MENISPERVACEAE.)

Vern¹ Sans.—Guduchi, Amrita. *Beng.*—Gulancha. *Hind.*—Gurach. *Mar.*—Gulwail, Guloe, Gharol. *Tel.*—Tippa-tige. *Tam.*—Shindil-kodi. *Guz.*—Gado.

Parts Used.—The whole plant.

Habitat.—It is generally found in the forests of Bengal, especially as a parasite on the mango and nim trees.

Collection and Storage.—It is collected in the hot season, when the bitter principle is most abundant, cut into pieces, dried, and kept in a dry place.

Chemical Composition.—Contains (1) Berberine, (2) a bitter glucoside which cannot be crystallised and (3) a starch known as giloe-ka-sat.

Physiological Action.—Stomachic, bitter tonic. antiperiodic, diuretic and alterative. Fresh stem is more efficacious than the dry ones. It is a good substitute for Calumba.

Dose :—Of powder of stem, 20 to 40 grains. The decoction, 2 to 3 ozs. The fresh juice, 2 to 6 drams.

Therapeutics.—(1) In mild cases of intermittent fevers, in general debility after fevers and other exhausting diseases, in secondary syphilitic affections and in chronic rheumatism, it has been used with good results. In malarial fevers, it is sometimes more efficacious than quinine. It is credited with aphrodisiac properties.

(2) The fresh plant is said to be more efficacious, when taken with milk, in cases of rheumatism, acidity of urine and dyspepsia.

(3) The fresh juice of the plant is taken with milk as a general tonic.

(4) A cold infusion of *gulancha* is given with honey in bilious fever.

(5) A decoction of *gulancha* or its fresh juice is given with

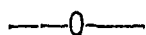
the addition of long pepper and honey in chronic fever with cough.

(6) *Gulancha* enters into the composition of a large number of prescriptions for chronic skin diseases. The juice of the plant or its decoction is given alone, or with the addition of *guggula* or *bdellium*.

(7) Numerous compound decoctions with the addition of various other drugs such as *nim*, turmeric, catéchú etc. are used in skin diseases as well as in gout and rheumatism.

(8) *Starch or Giloe-ka-sat*—It is prepared by powdering the stem and washing out the starch with water ; the latter retains a little of the bitterness of the drug.

It is an excellent remedy in urinary affections, and gonorrhoea ; it is also esteemed as a tonic in convalescence after fevers, splenic affections etc. The *palo* is to be taken with sugar, milk or rice gruel. Dose $\frac{1}{2}$ to 1 dram.



TRIBULUS TERRESTRIS

=गोक्षुर=

(*N. O. ZYGOPHYLLÆ.*)

Vern. Sans.—Gokshuri, Ikshugandha. **Hind.**—Chota Gokhur. **Beng.**—Gokhuri. **Mar.**—Lahana Gokhru. **Tam.**—Nerunji. **Tel.**—Palleru-mullu,

Parts Used.—The fruit and root.

Habitat.—This plant is common in sandy soil throughout India, plentiful in the United Provinces and in Madras.

Collection and Storage.—It should be kept in a cool, dry place and in air-light container.

Chemical Composition.—The extract of the powdered fruit was found to contain an alkaloid, a resin probably the source of the aroma, fat and mineral matter 14 p.c. The seeds are slightly bitter, due to the presence of an alkaloid,

Physiological Action.—Alterative, diuretic, demulcent and aphrodisiac. It is a weak substitute for Spirit Aether Nitrosi Tragacanth, Buchi and Uva Ursi.

Dose.—Powder of the fruit, 10 to 30 grains. Decoction of the fruit, 1 to 3 fl. ozs. (Take of the dry fruit, bruised, three ounces ; water, one and-a-half pint ; boil on a slow fire till the liquid is reduced to one pint, strain when cool).

Therapeutics.—(1) It is used as a vehicle for diuretic medicines in dysuria, gonorrhoea, urinary disorders.

(3) It is used in painful micturition, calculous affections, and impotence.

(3) The root is an ingredient of *Dasamula*.

(4) A decoction of the fruits is given with the addition of *yavaksha'ra* (impure carbonate of potassium) in painful micturition.

(5) Equal parts of *gokhura* and sesamum seeds, taken with goat's milk and honey, is said to cure impotence arising from youthful vice.

(6) According to Mohdeen Sheriff, the fruits are useful in cases of strangury, gleet and chronic cystitis.

(7) An infusion made from the fruit has been found very useful in gout, kidney diseases and gravel.

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TRICHOSANTHES DIOICA.

=पटोल=

(*N. O.*—CUCURBITACEAE)

Vern Sans.—Patola. **Hind.**—Palwal. **Beng.**—Patol. **Mar.**—Karu-parval. **Guz.**—Parwar. **Tam.**—Kattup-pepudal. **Tel.**—Chyad-potta.

Parts.—The root, leaves and fruit.

Habitat.—This creeping plant is plentifully found in Bengal.

Collection and Storage.—The leaves are collected before the plant gives fruit. It should be kept in a cool dry container.

Chemical Composition.—The dried plant contains an alkaloid to the extent of 0.1% (See Appendix)

Physiological Action.—Twigs and Leaves are tonic, laxative, alterative, febrifuge and vermifuge. (See Appendix) The unripe fruit is cooling and laxative.

Dose :—of decoction, 2 to 3 ozs., of fresh juice, 1 to 2 drs.

Therapeutics.—(1) The unripe fruits are used as a culinary vegetable and are considered very wholesome and especially suited for the convalescent,

(2) The fresh juice of the unripe fruit is used as a cooling and laxative adjunct to some alterative medicines.

(3) In bilious fever, a decoction of *patola* leaves and coriander in equal parts is given as a febrifuge and laxative.

(4) The tender tops are used as a pot-herb and are regarded as tonic and vermifuge.

(5) The bulbous root is classified amongst purgatives by Susruta.

(6) *Patoladi kvatha* (पटोलादि क्वाथ).—Take of *patola* leaves, red sandal wood, root of *Sansevieria Zeylanica* (*murva*), *Picrorrhiza Karroa* (*katuki*), *Stephania hernandifolia* (*pa'ha't*) and *gulanha*, each one drachm, water half a seer, boil together till reduced to one-fourth. This is useful for fever.

(7) *Chakradutta* recommends the following decoction as a valuable tonic, alterative, febrifuge and is given in boils and skin diseases—Take of *patol* leaves, *gulanha*, *mustaka*, *chiretta*, *nim* bark, catechu, root of *Justicia Adhatoda* (*va'saka*), and *Oldenlandia herbaacea* (*parpata*), equal parts, in all two tolas, and prepare a decoction in the usual way.

(8) *Patoladya Churna* (पटोलाद्य चूर्ण)—Take of the root of *Trichosanthes dioica* (*patola*), turmeric, *babrang* seeds, *kamala* powder, and the three myrobalans, two tolas each, cinnamon, and the root of the indigo plant, three tolas each, *Ipomoea Turpethum* (*trivrit*) four tolas; powder the ingredients finely and mix. Dose, about one drachm with cow's urine. After the use of the medicine, light food only (such as gruel) should be taken. It is a drastic purgative in jaundice, anasarca and ascites.

TRIGONELLA FOENUM GRAECUM.

मेथि

(*N. O.*—LEGUMINOSÆ.)

Vern Sans.—Methi. *Hind.*, *Mar.*, *Guz.*, *Beng.*—Methi. *Tam.*—Vendayam. *Tel.*—Mentula. *Eng.*—Fenugreek. *Fr.*—Fenugrec.

Parts Used.—The seeds.

Habitat.—This herb is found wild and extensively cultivated in Kashmir, the Punjab, Bombay and Madras Presidencies.

Collection and Storage.—Is to be kept in a dry place.

Chemical Composition.—The cells of the testa contain tannin. The cotyledons contain yellow colouring matter, but no sugar. The seeds contain a foetid bitter fatty oil 6 p.c., also resin and mucilage 28 p.c., albumin 22 p.c., two alkaloids—choline and trigonelline. The seeds on incineration leave ash 7 p.c., containing phosphoric acid 28 p.c.

Physiological Action.—The seeds are mucilaginous, demulcent and diuretic, also tonic, carminative, emmenagogue, astringent, emollient and aphrodisiac.

Dose :—Of the powdered seed, 5 to 20 grains. Decoc.—2 to 4 ozs. Infusion.—2 to 4 ozs.

Therapeutics.—*Externally.* (1) The flour of the seeds is used as a poultice to inflamed parts.

(2) In cases of leucorrhoea, absorbent gauze soaked in a paste of fine powder of methi is used for the vagina. as plugs.

Internally.—(1) The seeds as a condiment form an ingredient of curry powders.

(2) The seeds are used in colic, flatulence, dysentery, diarrhoea, dyspepsia with loss of appetite, diarrhoea in puerperal women, chronic cough, dropsy and enlargement of the spleen and liver.

(3) An infusion of the seeds is given to small-pox patients as a cooling drink.

(4) The seeds are generally, roasted, powdered and given in infusion to dysentery patients.

(5) Several confections under the name of *Melhi Modaka*, *Svalpa melhi modaka* are recommended for use in dyspepsia with loss of appetite, in the diarrhoea of puerperal women and in rheumatism.

Melhi Modaka (मेथि मोदक),—Take of the three myrobalans, ginger, long peper and black pepper, tubers of *cyperus rotundus* (*mustaka*), nigella and cumin seeds, coriander, bark of *Myrica sapida* (*kātpa'la*), *pachak* root, *Rhus succédanea* (*karkatasringi*), *ajowan*, rock salt, black salt, leaves of *Pinus webbiana* (*ta'lisā*), flowers of *Mesua ferrea* (*nagakesara*), *tejpatra*, cinnamon, cardamom, nutmegs, mace, cloves, sandal wood and camphor one part each ; fenugreek seeds, in quantity equal to all the above ingredients ; powder them all and prepare a confection with old treacle. Dose, one to two drachms to be taken in the morning with clarified butter and honey.

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URARIA LAGOPOIDES

चाकुले

(*U. O.*—LEGUMINOSÆ.)

Vern. Sans.—Prisniparni. **Beng.**—Cha'kulia. **Hind.**—Pithvan. **Mar.**—Davalā.

Parts Used.—The whole plant esp. the roots.

Habitat.—It is found in tropical parts of Nepal and Bengal.

Collection and Storage.—This should be kept in a cool, dry place.

Chemical Composition.—It does not contain any alkaloid.

Physiological Action.—Alterative, tonic and anticatarrhal, but is seldom used alone.

Dose.—Of decoction, 2 to 3 ozs. Of root-powder, 20 to 30 grains.

Therapeutics.—(1) This is one of the ingredients of *Dasamula*, which is very useful in alleviation of the three faults *Vayu*, *Pitta* and *kapha*), as well as of cough.

(2) According to Sushruta, it was given with milk to women in the seven month of their pregnancy to produce abortion.

(3) The plant is said to be an antidote to *Phoorsa* snake (*Echis Carinata*).

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VERNONIA ANTHELMINTICA

(सोमराजो)

(*N. O.*—COMPOSITÆ)

Vern. Sans.—Somar'aji, Avalguja, va'kuchi. **Hind.**—Ka li-jiri, Somraj, Bakchi. **Beng.**—Somraj. Seeds Bunchki-da'na' **Guz.**—kadvo-jiri. **Tam.**—ka'ttu-shiragam. **Tel.**—Adavi-jilakara.

Parts Used.—The seeds.

Habitat.—This plant is common in waste places near villages throughout India.

Collection and Storage.—Mature well dried seeds are to be kept in a dry place.

Chemical Composition.—The seed contains resins, an alkaloid known as vernonine, an oil and ash 7 p. c., free from manganese.

Physiological Action.—The seeds are anthelmintic, stomachic, tonic, diuretic, antiperiodic and alterative.

Dose.—Powder of the seeds, 10 to 60 grains.

Externally.—(1) *Va'kuchi* seeds four parts and orpiment one part are rubbed into an emulsion with cow's urine, and applied to the patches of white leprosy or leucoderma.

(2) *Brihat Somaraji taila* (बृहत् सोमराजो तैल)—Take of *va'kuchi* seeds, twelve seers and a half, water sixty-four seers, and boil down to sixteen seers. Take of the seeds of *Cassia Tora* (*Chakramarda*) twelve seers and a half, water sixtyfour seers, and boil down to sixteen seers. Boil these two decoctions with sixteen seers of cow's urine, sixteen seers of mustard oil and the following substances in the form of a paste, namely root of

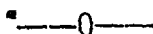
2 *Plumbago rosea* (*raṅtāchitrakā*), of *Gloriosa superba* (*la'nguli*), ginger, turmeric, *patchak* root, (latin name) seeds of *Pongamia glabra* (*Karanja*), root *clitoria ternatea* (*apara'jita*), of *Nerium odorum* (*Swet Karavi*) and of *Calotropis gigantea* (*arṇa*), bark of *Alstonia scholaris* (*saptaparni*, *Chattim*), wood of *Acacia catechu*. (*Khadira*), of *Symplocos Racemosa* (*lodhra*), black pepper, *nim* leaves, leaves of *Cassia Sophora* (*ḥasamarda*), juice of cowdung, orpiment and realgar, each eight tol'as. This oil is said to cure all sorts of skin diseases from vitiated blood, ringworm, prurigo etc.

Therapeutics.—*Internally*. (1) Dr. Gibson says "It is a valuable tonic and stomachic in doses of 20 to 25 grs.

(2) Dr. A. Ross speaks favourably of an infusion of the powdered seeds (in doses of from 10 to 30 grains) as a good, certain anthelmintic for ascarides.

(3) In leucoderma, a decoction of emblic myrobalan and catechu is given with the addition of powdered *vākuchi* or *bunchḥi dana* seeds. (Chakradatta).

(4) Take of *vākuchi* seeds, and black sesamum, equal parts ; powder and mix. Dose, about a drachm to be taken in the morning, with tepid water. The medicine should be taken after perspiration has been induced by exercise or exposure to the sun. It is very useful in the severer forms of skin diseases, such as psoriasis, and lepra.



VITEX NEGUNDO

(निषिन्दा)

(N O.—VERBENACEÆ)

Vern. Sans.—Nirgundi, Sindhavā'ra. **Hind.**—Sambh'alu. Nisinda. **Beng.**—Nisinda. **Mar.**—Nigudi. **Tam.**—Nir-nochi, **Tel.**—Niru-va'vili. **Guz.**—Niguri.

Parts used.—The leaves and root.

Habitat.—Bengal, southern India and Burma.

Collection and Storage.—The leaves are dried and kept in a dry place.

Chemical Composition.—The leaves contain an essential oil and resin; the fruits contain an acid resin, an astringent organic acid, malic acid, an alkaloid and a colouring matter.

Physiological Action.—The root is tonic, febrifuge and expectorant, also diuretic. The leaves are externally antiparasitic and powerfully discutient; internally, alterative, aromatic, bitter, vermifuge and anodyne.

Dose.—Of fresh juice, 2 to 4 drs. powder of root-bark, 10 to 20 grains.

Therapeutics.—*Externally*,—

(1) The leaves are used to preserve rice and clothes from the ravages of insects.

(2) The fresh leaves are heated in an earthen pot and applied to the swelling, and kept *in situ* by a bandage, the application is repeated three or four times a day until the swelling subsides.

(3) Dried leaves are smoked in cases of headache and catarrh.

(4) A pillow stuffed with the leaves of *nirgundi* is placed under the head for relief of headache.

(5) The juice of the leaves is said to remove foetid discharges and worms from ulcers.

(6) An oil prepared with the juice of the leaves is applied to sinuses and scrofulous sores.

Internally.—(1) The juice of the leaves is used for soaking various metallic powders, before making the latter into pills.

(2) A decoction of *Nirgundi* leaves is given with the addition of long pepper in catarrhal fever with heaviness of head and dullness of hearing.

(3) In splenic enlargement, 2 tola's of the juice with 2 tola's of cow's urine is given every morning.

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VITIS VINIFERA

=द्राक्षा=

(N. O.—AMPELIDFÆ.)

Vern. Sans.—Dra ksha', Mridvik'a. **Hind.**—Angur, Da'kh. **Beng.**—Kismis. **Eng.**—The Vine. **Fr.**—Vigne cultivee. **Guz.**—Drakh. **Mar.**—Draksha. **Tam.**—Dirakhsha-pazham. **Tel.**—Draksha-pandu.

Parts Used.—Dried fruits called raisins.

Habitat.—Grapes are largely cultivated in North-Western India, in the Punjab, Kashmir, Baluchistan and Afghanistan.

Collection and Storage.—Comes in bags; these are to be kept in a dry place.

Chemical Composition.—The fruits contain grape-sugar (glucose), gum, tannin, tartaric, citric, malic acids, chlorides of potassium and sodium, sulphate of potash, tartrate of lime, magnesia, alum, iron, some albumin, and acid tartrate of potassium, Tartaric acid is the characteristic acid of the grapes. Raisins contain calcium, magnesium, potassium, phosphorus and iron in assimilable form; besides gum and sugar. The seeds contain a dense fixed oil or fat and tannic acid 5 p. c. The skins contain tannin.

Physiological Action.—Grapes are demulcent, laxative, refrigerant, diuretic and cooling. Raisins (dried grapes) are laxative, demulcent and expectorant, also considered as attenuant suppurative, nutritious and blood-purifier.

In large doses, demulent, expectorant and laxative. In smaller doses, astringent.

Dose.—Of the raisins, from half to one ounce, 3 or 4 times in the 24 hours. Skin and stones from the grapes should be removed before use.

Therapeutics :—(1) Black raisins is generally used as an ingredient in purgative mixtures.

(2) The *Sherbet* or syrup of grapes (made by boiling the dried raisins in 20 times of water, mash and straining) is a very pleasant and cooling drink and proves very useful in

relieving thirst and other pyrexial symptoms, cough, hoarseness and consumption.

(3) Take of raisins, emblic myrobalaris, dates, long pepper and black pepper, equal parts, rub them together with honey and clarified butter and administer as a linctus. This is used as demulcent and expectorant medicine.

(4) Raisins are used in dysuria, strangury and cases of bilious dyspepsia.

(5) It is one of the best and most agreeable vehicles for other medicines, particularly those used in dyspepsia, diarrhoea and dropsical affections.

(6) *Dra'k'k'hsha' arishta* (द्राक्षारिष्ट)—Take of raisins six seers and a quarter, water one hundred and twenty eight seers boil them together till reduced to one fourth and strain. To the strained decoction add twenty five seers of treacle and eight tola's each of the following substances in fine powder, namely cinnamon, cardamoms, *tejpatra*, flowers of *Mesua ferrea* (*na'gak'esara*), fruit of *Aglaia Roxburghiana* (*priyangu*), black pepper, long pepper and *ba'beraag* seeds, and set aside for fermentation. This liquor is considered invigorating, and nourishing and is used in consumption, cough, difficult breathing and hoarseness.

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WEDELIA CALENDULACEA.

= भृङ्गराज =

(N. O.—COMPOSITAE)

Vern. Sans.—Bhringara'ja', Kesara'ja. **Beng.**—Kesara'ja. **Hind.**—Bha'ngra'.

Parts Used.—The whole plant.

Habitat.—Is met with in wet places of Assam, Sylhet and the Eastern and Western Peninsula.

Chemical Composition.—A large amount of resin and an alkaloidal principle.

Physiological Action.—The leaves are tonic, alterative.

Dose.—Of fresh juice, one to two tola's. Of powder, 10 to 30 grains.

Therapeutics. Externally.—(1) The juice of the leaves is used as a snuff in cephalalgia, and in soaking various sorts of powders for the preparation of pill.

(2) The expressed juice is dropped into the ears in earache.

(3) *Shadabindu taila* (षड्विन्दु तैल)—Take of sesamum oil, four seers, juice of *bhringara'ja* leaves, sixteen seers and prepare an oil with a paste composed of the following substances, namely, root of castor oil plant, and of *Tabernoemontana coronaria* (*tagara*), dill seeds, *Caelogyne ovalis* (*jivanti*) *Vanda Raxburghii* (*ra'sna'*), rock salt, *Wedelia calendulacea* (*bhringaraja*), *baberang* seeds, liquorice root and ginger, in all one seer. Few drops of this oil, drawn in through the nostrils, and rubbed over the temples and forehead are said to relieve headache and other affections of the head.

(3) *Bhingara'ja taila* (भृङ्गराज तैल)—Take of sesamum oil four seers, juice of *bhringara'ja* leaves, sixteen seers, iron rust, the three myrobalans and the root of *Ichnocarpus frutescens* (*syamalata'*), reduced to a paste, in all one seer, and prepare an oil in the usual way. This oil is said to remove scurf from the head, turn grey hairs black and cure alopecia.

(4) The fresh juice of leaves of *Bhingara'ja*, is rubbed on the shaven scalp for the purpose of promoting the growth of hair.

Internally—(1) The leaves are given with ajowan seeds in catarrh, cough, and enlargement of the liver and spleen.

(2) Two drops of its juice are given with eight drops of honey to new born children, suffering from catarrh.

(3) The juice of the leaves is given in one tea-spoonful doses in jaundice.

(4) *Jatiphaladya churna* (जातीफलआद्य चूर्ण)—Take of nutmeg, *baberang* seeds, plumbago root, flowers of *Tabernoemontana coronaria* (*tagara*), sesamum seeds, leaves of *Pinnus Webbiantu*

(*talisa*), red sandal wood, ginger, cloves, cumin seeds, camphor, chebulic and emblic myrobalans, black pepper, long pepper, bamboo-manna, cinnamon, cardamom, *tejapatra*, and the flowers of *Mesua ferrea*, (*nagakesara*), each two tola's, powdered leaves of *Wedelia Calendulacea*, fifty six tola's, sugar, in quantity equal to all the ingredients. Powder and mix. Dose, about a drachm. This preparation is said to be useful in phthisis, cough and catarrh.

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WITHANIA SOMNIFERA

= अश्वगन्धा =

(N.O.—SOLANACEAE)

Vern. Sans.—Asvagandha. *Hind.*, *Guz.*,—As-gandh. *Beng.*—Asvandaha. *Mar.*—Asvagandha. *Tam.*—Amkulang-kalang. *Tel.*—Penerru-gadda.

Parts Used.—The root the leaves and the entire plant.

Habitat.—Dry subtropical regions of India and southern Europe.

Collection & Storage.—The plant is to be harvested, when in inflorescence and dried in the shade and kept for use.

Chemical Composition.—The drug has two principles—one a bitter crystalline principle and the other an alkaloidal body.

Physiological Action.—Tonic, alterative and aphrodisiac. The drug has got a sedative action on the nerves ; The sedative effect is probably due to the action of the bitter principle which when injected into a guineapig caused a sort of sedative action. The drug although acts as a sedative has got no depressant action on the heart at the same time.

Dose.—40 to 60 grains.

Therapeutics. *Externally*—(1) The leaves moistened with castor oil is used as an external application in cases of Carbuncle.

(2) *Narayan taila* (नारायण तैल)—(which contains *Asvagandha*) is dropped into the ear in deafness and is used as an ununction over the body in hemiplegia, tetanus, rheumatism and lumbago.

Internally—(1) Root-powder is used in consumption, emaciation of children, debility from old age, rheumatism etc.

(2) In consumption, a decoction of *asvagandha* root and long pepper is given with the addition of clarified butter and honey.

(3) For improving the nutrition of weakly children, the root reduced to a paste, is recommended to be taken with milk and clarified butter for a fortnight.

(4) *Asvagandha ghrita* (अश्वगन्धा घृत)—Take of the decoction of *asvagandha* root one part, milk ten parts, clarified butter one part ; boil them together and prepare a *ghrita*. It is said to promote the nutrition and strength of children.

(5) About half a drachm of *asvagandha* root taken with milk or clarified butter is said to act as an aphrodisiac and restorative to old men.

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WOODFORDIA FLORIBUNDA

= धातकी =

(N. O.—LYTHRACEÆ.)

Vern. Sans.—Dha'taki, Agnijva'la. **Hind.**—Dha'i. **Beng**—Dhaiphul. **Mar.**—Dhaiti. **Tel.**—Serinji. **Eng.**—Grislea.

Parts Used.—The flowers.

Habitat.—Common in parts of India.

Collection and Storage.—The flowers are to be dried and kept in air tight container.

Chemical Composition.—The bright red flowers contain tannin 20 p. c.

Physiological Action.—They are astringent and stimulant.

Dose.—40 to 60 grains.

Therapeutics.—(1) The powder of flowers is sprinkled over vesicular eruptions and foul ulcers to diminish the discharges and promote granulations,

(2) The dried flowers of *Woodfordia floribunda* in combination with other astringent medicines are used in bowel complaints and haemorrhages.

(3) Two drachms of the dried flowers are given with curdled milk in dysentery, and with honey in menorrhagia.

(4) Take of the flowers of *Woodfordia floribunda*, bel fruits, bark of *Symplocos racemosa* (*lodhra*), root of *Pavonia odorata* (*ba'la'*), and the fruits of *Polios. officinalis* (*gajapipul*), in equal parts, two tolas in all and prepare a decoction in the usual way. This is given in the form of powder or decoction with the addition of honey in the dysentery of children.

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ZINGIBER OFFICINALE.

=आद्र क=

(*N. O.*—SCITAMINEAE,)

Vern. Sans.—Ar'draka, Sringavera. **Hind.**—(Fresh) Adrak adi, (dry) South. **Mar.**—(Fresh) Alen, (dry) south. **Beng.**—(Fresh) Ada, (dry) sout. **Tam.**—(Fresh) Inji, (dry) shukku. **Tel.**—(Fresh) Allom, (dry) souti.

Parts Used.—The rhizome.

Habitat.—It is plentifully cultivated in many parts of India.

Collection & Storage.—The rhizomes are collected well dried and kept in a dry place ; if not well dried the rhizome will not.

Chemical Composition.—(1) An aromatic volatile oil, to which the flavour is due (2) *Gingerin* or *Gingerol* (3) Several resins and allied bodies.

Physiological Action.—Aromatic, stimulant, carminative, stomachic, also sialogogue and digestive. Locally it is rubefacient, and anodyne.

Dose :—Of fresh juice, 2 to 4 drams ; of powder, 10 to 30 grs.

Therapeutics Externally,—(1) The dry rhizome powdered and made into a paste with warm water is applied to forehead for relieving pain.

(2) In cephalgia and other affections of the head, ginger juice mixed with milk is used as a snuff.

(3) Saindhava'dya taila (सैन्धवाद्य तैल)—Take of dry ginger forty tolas, rock-salt, long pepper root and plumbago root, sixteen tola's each, marking nuts twenty in number, fermented rice water sixteen seers, sesamum oil four seers, boil them together and prepare an oil in the usual way. This oil is rubbed externally in sciatica and other forms of rheumatism.

Internally—(1) When it is chewed, it relieves the pain of decayed tooth.

(2) It is very beneficial in cough and cold, if taken with sugar or honey.

(3) Ginger with salt taken before meals, is highly praised as a carminative.

(4) It is said to purify the tongue and throat, increase the appetite and produce an agreeable sensation.

(5) It is much used as a carminative adjunct along with black pepper and long pepper under the name of *Trikatu*.

(6) It is used as a flavouring adjuvant to bitters.

(7) It is useful in dyspepsia, affections of the throat, head and chest, piles, rheumatism, urticaria, dropsy etc.

(8) *Samasarkara churna* (शमशर्करचूर्ण)—Take of cardamoms one part, cinamon two parts, flowers of *Mesua ferrea* (*nagakesara*) three parts, black pepper four parts, long pepper five parts, dried ginger six parts, sugar in quantity equal to all the other ingredients. powder and mix. Dose about a drachm in dyspepsia, loss of appetite, and piles.

(9) *Ardra Ka Khanda* (अर्द्रकखण्ड)—This is a confection made with ginger, clarified butter, milk and sugar with the addition of a number of aromatics in small quantities. It is used in urticaria,

INTRODUCTION

TO THE

MINERAL DRUGS OF THE

PHARMACOPŒIA INDICA



The progress of chemistry or the art of preparing metals and metallic compounds, as well as of salts (inorganic or organic) for medicinal use, was rather slow in the early days of Hindu medicine.

The first pioneer work of Charaka—does not deal with any mineral drugs, except Iron in some few instances.

A later worker Susruta, used the natural salts e. g., chloride of Sodium, impure carbonate of Potash and Soda, Borax etc. He also mentions the use of Iron in anaemia and concisely referred to the therapeutic properties of silver, copper, tin, lead and also of precious stones, but no detailed information regarding their calcination, purification or administration in special diseases are given by Susruta. Chakradatta gives processes for reducing iron, copper and talc to powder form and also prescriptions for the use of these remedies.

Sarangadhar gives detailed account of the calcination and preparation of the different metals, such as gold, silver, iron, copper, mercury, tin and lead and also their mode of administration in different diseases. As mention is found of the use of opium, it is concluded, that his treatise was published during the Mahomedan period.

After him, followed a host of writers with their publications in nearly all the provinces of India, on the use of metals and their combinations in treatment of diseases,

The important items of the various treatises are embodied in Bhabaprokas—and in the two works on the inorganic medicine generally used in Bengal—Rasendra Sar-Sangraha and Rasendra Chintamani.

In these treatises we find Hindu physicians freely and properly use such powerful drugs as arsenic, mercury, iron etc. long before these were used anywhere in the world.

In the present work we propose to give a detailed description of the source, the methods of purification, of calcination, and use of these inorganic substances in the following order.

(1) Source of the substance, its description and the impurities occurring in it.

(2) Correction or शोधन of metals or metallic compounds.—Metals are subjected to a so-called process of correction in order to get rid of their impurities or deleterious qualities. If used in an uncorrected state, they are supposed to induce certain diseases or morbid symptoms. Metals are generally corrected by repeatedly heating their leaves and plunging the heated sheets in fresh vegetable juices, oils or decoctions, etc. The different metals are differently treated and we shall describe the most efficacious modes of treating them.

(3) Marana or Killing of metals मूर्च्छित, मृतप्राय —Metals and metallic compounds are reduced to powder, by various processes. The operation is called *Marana* which literally means killing or destruction of metallic character, but practically, a reduction to powder, either in the metallic state or after conversion into an oxide or sulphide. Various processes are described in Sanskrit text books, but we shall confine ourselves to such modes of preparation, as are found suitable from our experience.

(4) Nirutha Karan or सम्पूर्ण मृत

By the ordinary process of मारण the metal is converted into powdered metallic oxide or sulphide state ; but by treating it with *mitrapanchaka* मित्रपञ्चक followed by heating to white heat, the original metallic state can be restored. But when a metal cannot be restored to its original condition, it is known—as Nirutha (निरुत्थ) or fully killed.

Generally the metals are used in the “Marana” condition, the complicated laborious process of Nirutha-karan निरुत्थीकरण is rarely undertaken by the Ayurvedic practitioners.

* Ghee, (clarified butter) Honey, Guggula. (incense), Kunch (abrus precatorius) & Borax are called *mitrapanchaka* मित्रपञ्चक

CLASSIFICATION OF MINERAL

OR

INORGANIC MEDICINE

(पार्थिव औषधावली)

In Rasagrantha (e.g. Rasendra Sara-Sangha, Rasendrachintamani), mineral or inorganic medicines are described under five heads :—

(1) Rasa or Mercury (रस प्रकरण), which forms a class by itself.

(2) Upa-rasa or metallic ores and earths (उपरस) :—Sulphur (गन्धक), mica (अभ्र) *svarna-māḥshikā* (स्वर्णमाञ्जिक), *tāmra-mah'shikā*, (ताम्रमाञ्जिक), realgar, red orpiment (मनःशिला) sulphate of copper, (तुलिया), sulphate of iron (हिराकस), *sila jatu* (शिलाजतु), alum (फटकिरी), borax (सोहागा), *gairikā* (गैरिक), orpiment yellow arsenic (हरिताल), white arsenic (शङ्खविष, दारुमुज, साम्बलक्षार).

(3) Metals :—(a) Pure—e.g., gold, copper, silver, tin, zinc, lead, iron. (b) Compound metals (artificial)—संयोग धातु brass (पित्तल), bell-metal (काँसा). (c) Compound metals (natural)—उपधातु e.g., Mandoor.

(4) Ratna or precious stones—diamond, pearls, corals.

(5) Salts (लवण)—*Yava-ksh'ara* (यवक्षार) (impure carbonate of potash), *Sarjika' Ksha'ra* (सर्जिकाक्षार) (impure carbonate of soda), Nitrate of Potash, (सोरा) Alkalies and Ashes. (क्षार)

MERCURY

Mercury is the chief metallic element in Ayurvedic medicine and forms by itself a class known as Rasa (रस). It is described in the Tantric system of Hindu medicine. Generally it is known by the name of *Parada* or *Para* (पारद वा पारा) meaning, "that which takes mankind beyond the reach of diseases."

Source.—Mercury occurs rarely in the free state but generally as a compound—the Sulphide, known as Cinnabar or Hingool. This ore occurs in small quantities in Nepal, but the bulk of metal is obtained from China and Spain, mixed with different kinds of clay.

Description.—Pure Mercury is a fluid metal, as white as silver, "like the midday sun" externally, but with a faint bluish tinge internally. It is divisible into mobile spherical globules, without any odour or taste.

Impurities.—Mercury, as obtained in the market, contains impurities such as lead, tin, dirt etc. These are physical impurities.

In Ayurvedic books several varieties of natural impurities are described such as (1) Visha (poison)—विषदोष, (2) Vanhi—(वह्निदोष) (fire), (3) Mala (dirt, dregs). मलदोष ।

रसेन्द्र सार संग्रह describes eight varieties of defects in mercury occurring in Nature and the injurious action that each of the impurities exerts on the human system and enjoins that only purified Mercury shall be used in medicine and all non-purified stuff is to be regarded as poison.

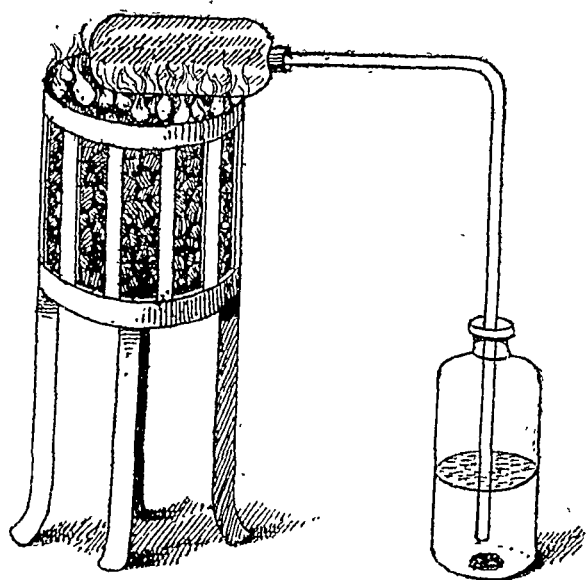
Purification of Mercury.—In order to eliminate the several varieties of impurities (sheaths, कञ्चुक)—the mercury is to be treated in order to remove the सप्त कञ्चुक ।

This is a very tedious and complicated process and the descriptions of the text books, can hardly be followed without the practical guidance of a preceptor or गुरु and some of the various

articles to be used in the purification processes are not available or capable of being identified easily.

Mercury as generally purified and used in the preparation of Ayurvedic medicines.—All the impurities and the processes of purification of mercury, as described* in Ayurvedic textbooks are laborious and tedious processes and while doing them, other impurities from extraneous sources, may come into the Mercury, that is being so purified.

In order to have mercury in pure form, free from all defects, the Kavirajes generally use the mercury distilled from cinnabar (हिङ्गुलोत्थ पारद) which is prepared in the following manner :



Apparatus for Mercury Distillation.—as devised by the author about 20 years ago and which is being now used by many eminent Kavirajes :—Pure mercury is obtained from Cinnabar Hingul by rubbing the substance with three parts of unslaked lime and putting the mixture into the bottom of the cylinder, up to one-third capacity and then filling up the remaining portion of the cylinder with powdered quicklime and heating the retort on fire covering the cylinder well with the coal and receiving the distilled mercury in a glass bottle half filled with water, as shown in the foregoing figure.

The various processes of preparation of Mercury from Hingul, as described in the Sanskrit text books—are laborious and complicated and a good portion of the mercury, is lost in the process whereas the process of the author as described above, generally yields the whole of mercury contained in the Hingool if carefully followed.

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PREPARATIONS OF MERCURY

Mercury, in the metallic state, is not used in Hindu medicine. It is generally used in the preparation of mercurial compounds, which are used, either alone or in combination with various other ingredients.

The compounds generally used are (1) Hingul or Cinnabar, (2) Kajjali, (3) Rasa-sindur, (4) Swarna-sindur or Makaradhwaj. There are other compounds, as (5) Pita bhasma or yellow compound and (6) Rasakarpura or white compound which are also used in Ayurvedic practice.

Action of Mercury Compounds—The principal mercury compounds Hingul, Kajjali, Rasa Sindur and Makaradhwaj all contain sulphur in combination with mercury and are ordinarily insoluble in acids and alkalies.

These exert their therapeutic actions when administered in minute subdivision. Makaradhwaj or Rasa-sindur, when administered in a state of fine subdivision, has been observed to be absorbed by the mucous membrane of the intestinal tract in goats or rabbits and thereby modify the secretions of the glandular structure lining the canal (probably both the internal and external secretions). This modified secretion exerts, direct and indirect influence on the metabolism of the organism by regulating the liver and kidney functions. The minute finely subdivided substance also exerts a mechanical action on the intestinal flora, thereby modifying or inhibiting their growth and virulence. (See appendix).

It is also asserted by same observers that the gastric juice has got a dissolving action on the minutely divided substance and as such

a small fraction of the mercury may get absorbed into the system. But such untoward symptoms as are usually observed after the absorption of mercury as salivation, foul breath etc. are rarely found even when these compounds are administered for a long period.

The yellow compound—PITA-BHASMA (पीतभस्म) is an oxide and the white compound—RASA-KARPURA (श्वेतभस्म) is Subchloride of mercury (*calomel*). Both exert poisonous action if used in big doses or for a long period but both have been recommended for external and internal use.

“Mercury has the wonderful property of absorbing, as it were, the actions of the other drugs with which it is sublimed ; e.g. silver and copper, when roasted with mercury and sulphur impart their antispasmodic and tonic properties to the red sulphide which sublimes. Lead when roasted in a similar way with sulphur and mercury, imparts its astringent property to the red sulphide of mercury. When sublimed, with gold, the red sulphide becomes a valuable tonic, though red sulphide prepared without gold, has got quite different properties (Dr. H. C. Sen., M.D.).

Hingula—or red sulphide of mercury is known as Cinnabar. It is seldom used as it occurs in nature. Another preparation, vermilion, is a bright red pigment, used mostly for colouration.

It is obtained in the Calcutta market in two varieties—soft and hard ; the soft one contains more mercury than the hard variety. Both are artificial (Sanskrit Text Books describe 3 natural varieties and we have them now only as museum specimens).

The soft variety is used in the manufacture of Hingulottha Rasa as mentioned before and the hard variety is used in medicine, after being duly corrected by soaking in lemon juice.

Dose— $\frac{1}{2}$ to 2 grains.

Preparations from Hingula (only one of each class.)

(1) **Hinguleswara** (हिंगुलेश्वर).—It contains equal parts of cinnabar, mitigated aconite and long pepper, rubbed together and made into pills about one grain each. This is given mixed with a little honey in fevers with pain all over the body.

(2) **Sree Mrityunjaya Rasa** (श्रीमृत्युञ्जयरस)—It contains cinnabar two parts and mitigated aconite, sulphur, black pepper and long pepper and borax each one part, well powdered and rubbed with water for several days and then made into one-grain pill. It can be given in typhoid, rheumatism, chronic fevers and indigestion.

(3) **Ananda bhairava Rasa** (आनन्दभैरव रस)—It contains cinnabar, mitigated aconite, black pepper, borax and long pepper in equal parts, well powdered and made into two-grain pills and taken with honey mixed with the decoction of the bark of *Holarrhena Antidysenterica*. It is specific for any kind of diarrhoea, chronic or acute pains in the body and also in Typhoid conditions.

II. **Kajjali**—(Hydrargyri Sulphidum Nigrum) Mercury and Sulphur equal parts, rubbed together. It should be of uniform consistence, quite impalpable and lustreless so that no grittiness should be felt. This uniform compound is generally obtained by rubbing the constituents for 24 hours in a stone pestle and mortar.

Properly made Kajjali will float on the surface of water—although this compound is made of mercury and sulphur, which are much heavier than water ; if the preparation sinks in water, the compound is not a proper one.

Preparations from Kajjali—When this chemical compound is heated just to allow the sulphur to melt, the fused mass becomes superior to the black sulphide in its therapeutic value. This is known as—

(1) **Krishna-parpati** (कृष्ण-पर्पटी)—Which is made by melting the Kajjali in an iron ladle and as soon as the sulphur melts and shows the variegated colours of peacock feather, the molten substance is put in a cow dung cavity covered with soft green plantain leaf and pressed over by a similar cowdung mass covered with plantain leaf. On being pressed and cooled, the mass is converted into thin disc-shaped pieces, ready for use.

It is used in increasing doses commencing from one grain, daily gradually increased to ten grains as maximum and then again reducing the dose by one grain per day till by the 21st day, the dose is reduced to nil.

This is to be administered once daily, in morning in empty stomach with honey & cumin powder. During the administration, the patient should be kept in rest, avoiding exposure and mental disturbances.

Dr. H. C. Sen, M. D. observes—"The sulphides of mercury are direct cholagogues and they have no equal in chronic dysentery, even of the sloughing type. The precaution of stopping salt and water must be strictly carried out. I have cured many obstinate cases of dysentery, cirrhosis of the liver, with accumulation of fluid in the peritoneal cavity and obstinate cases of dyspepsia and chronic diarrhoea with these sulphides."

He recommends daily use of 10 to 15 grains in two or three doses.

(2) *Mahagandhak* (महागन्धक)—firstly mercury and sulphur (*Kajjali*) are made into *Krishna-parpati*: then adding nutmegs, mace, cloves and neem leaves two tollahs each—powdered, mixed together and roasted in conch shell—till the whole becomes red on cowdung-fire.

It is administered in doses of 2 to 4 grains in the acute diarrhoea of children and is useful in chronic diarrhoea of adults.

(3) *Krishna Chatoormukh* (कृष्णचतुर्मुख)—Mercury, sulphur, reduced iron and mica—equal parts, gold $\frac{1}{4}$ part rubbed in the juice of Aloe Indica till well mixed—and afterwards the mass is covered with castor oil leaves and then kept within paddy heap for 3 days.

Dose—2 to 4 grains to be given twice daily or a single dose at bed time to calm the condition of the patient for sleep.

III. *Rasa-sindura* (रससिन्दुर) (*Hydrargyri Sulphidum Rubrum*) Red Sulphide of Mercury (रक्तभस्म) is prepared in varieties of ways and we narrate one of them.

Take of mercury and sulphur equal parts, rub together with the juice of red buds of *Ficus Bengalensis* (वर) for three days successively; introduce the mixture in a strong black bottle about one pint capacity, covered over with old cloth and mud and well dried in the sun. This black bottle covered with dried earth and containing the mixed mercury and sulphur,

is put on a sand-bath and heated for 12 to 24 hours according to the heat applied. A red deposit will adhere below the neck of the bottle and is taken out by breaking the bottle as dark red shining scales.

Dose—1 to 2 grains.

Preparations from Rasa Sindura.

(1) **Chintamony Chatoormukh** (चिन्तामणि चतुर्मुख)—Rasa Sindura two parts, prepared talc one part, prepared iron one part, prepared gold leaf half part. Rub them together with fresh juice of Aloe Indica for 3 days and make into one-grain pills; this preparation is useful in soothing nervous excitement and disorders arising from derangements of the nervous system.

(2) **Rasa-Raj-Rasa**—(रसराज रस) Rasa-sindura eight parts, mica two parts and Gold one part. Rub well in the freshly extracted juice of Aloe Indica. Afterwards add Iron, Silver, Zinc, *Withania somnifera*, cloves, mace, *khirkaḥoli* each half part; mix and rub in the juice of kak-mache (*Solanum Nigrum*) and make into ten grain pills. It is administered rubbed with honey or with milk and sugar.

It soothes the nervous system to such an extent, that calm refreshing sleep is induced by taking one pill at bed time. The writer uses this Rasa-Raj-Rasa pill in cases of insomnia in fevers and nervous troubles with most beneficial results.

IV. **Makaradhwaja** (मकरध्वज वा स्वर्णसिन्दुर)—Red sulphide of mercury, sublimed with gold—is reputed to contain all the tonic properties of gold, besides the properties of the red sulphide of mercury.

Dose—1 to 2 grains.

Preparations—

(1) **Makaradhaj Rasayan** (मकरध्वज रसायन)—Gold two parts, Tin, Pearls, Iron, Nutmeg, Mace, Silver, Brass, Rasa Sindur, Coral, Musk, Camphor and Mica each one part, Makaradhaj four parts, all rubbed together and made into fine powder—Dose 2 grains.

It is a panacea for all diseases.

(2) **Brihat Chandrodaya Makaradhwaja**—(बृहत् चन्द्रोदय मकरध्वज) Makaradhaj one part, camphor one part, Nutmeg, Black

pepper, Cloves each four parts, musk one-sixteenth part—rub together into fine powder.

Dose—4 grains with juice of pan leaves.

It is a general stimulant, useful in all varieties of diseases with low muttering delirium and in typhoid condition.

It is also used as an aphrodisiac for strengthening the sexual powers and also as a cure in various diseases.

V. Yellow Compound (पीतभस्म)—The yellow preparation called Pitabhasma is made as follows:—Take mercury and sulphur equal parts and rub them together with the fresh juice of phyllanthus neruri (bhumi-amlaki) or Helio-tropium Indicum (hastisundi) for seven days. Place the mixture in a covered crucible and heat it on a gentle fire for twelve hours. The result will be a yellow compound.

Dose :— $\frac{1}{2}$ to 1 grain to be given with the juice of pan leaves.

Action and Use—It excites the appetite, cures fever and abdominal diseases. It imparts lustre to the individual and increases courage and relieves pains of the joints.

VI. Rasakarpur (रसकपूर)—Subchloride of Mercury—*Calomel* (श्वेतभस्म),—it is erroneously known as perchloride of mercury and ignorant dealers by substituting perchloride of mercury as Rasakarpur did actually become instrumental in producing poisonous symptoms, in cases where Rasakarpur, was intended to be used as calomel and not as perchloride of mercury.

Rasakarpur—is now prepared not according to the processes described in Sanskrit works, but by subliming the black sulphide of mercury with common or rocksalt. Rasakarpur—as is available in the Calcutta Market is pure Subchloride of mercury (calomel) occurring in prismatic crystals although mixture of Subchloride and Perchloride are sold as Rasakarpur and the practitioners should procure the stuff, from a source, which will guarantee the purity of the substance.

Dose— $\frac{1}{8}$ to $\frac{1}{2}$ grain—repeated as required. It is said to be administered in big doses upto 8 grains enclosed in a ball of wheat-flour and covered with powdered cloves, swallowed with water, so as not to touch the teeth.

Salts and acids are forbidden to be taken after the use of this medicine.

Uses—In secondary syphilis, Rasa-karpura is given in small doses in combination with cloves, saffron, sandal wood and musk.

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SULPHUR.

= गन्धक =

Vern. Sans.—Gandhaka. **Eng.**—Brimstone. **Arab**—Kibrika. **Pers.**—Gowgird. **Hind.**—Gandak. **Beng.**—Gandrak. **Tel. Tam.** and **Mal.**—Gendagum.

Source.—In India it occurs naturally in Nepal, Kashmere, Afghanistan and Burma. It is a constituent of several vegetable and animal substances. It is obtained by roasting or by sublimation.

Varieties—Four varieties of sulphur are mentioned by Sanskrit writers viz. red, yellow, white and black. Of these the red and black are now not available. The yellow variety (अमलासार) i.e. sulphur in lumps is preferred for internal use; the white variety known as roll sulphur is inferior to yellow variety and is used for external application.

Correction of Sulphur before Medicinal use :—Take 2½ lbs. of Amalasara-sulphur in powder in an open iron pan. Take also a brass vessel containing 10 lbs. of juice of *Eclipta Erecta* (Bhringaraj). Tie a thin piece of cloth on the mouth of the brass vessel. Put the open iron pan on fire. When the sulphur is in liquid condition, pour it on that brass vessel containing the juice of Bhringaraj. Repeat the process for seven times. When the whole thing becomes cool, take the sulphur out and rub it in a stone mortar to make it into a fine powder. The sulphur

corrected by the above method is known as *Gandhaka Rasayan* in Ayurveda.

Dose—6 to 24 grs. as an alterative and tonic. 45 grs. as a cholagogue and laxative. Honey, clarified butter (Ghee), cow's milk or confection Roses (Gulkand) may be used as anupan according to indications.

Physiological Action.

Externally : Skin—Sulphur is antiseptic, disinfectant and parasiticide. Sulphur in sticks is selected for external purpose. It is used as a fumigation to disinfect rooms occupied by sick persons. It has got its antiseptic and parasiticide action, on the broken as well as on the unbroken skin. On the unbroken skin it is used as liniment in the form of ghritha or taila and on the ulcerated surface it is used in the form of Taila to promote healing. It destroys Fungi and low forms of vegetable life.

Internally.

Lungs—The fumes of sulphur acts as an irritant and induces Bronchitis in susceptible persons.

Stomach—It moderates the gastric juice.

Liver—It stimulates the bile flow and hence it works as a cholagogue and laxative.

Intestine—It is a vermifuge and is an intestinal antiseptic and laxative.

Blood—It is a rasayan i.e. it purifies blood and improves it in all respects.

Toxicology.

Sulphur, without proper correction, if taken in an exceedingly high dose, or if taken in the medicinal dose for a certain period of time, causes poisoning. It produces the following diseases e.g. skin diseases, loss of semen and beauty, general debility etc.

Treatment of poisoning.

- (1) Stop taking sulphur in any form.
- (2) Cow's milk with cow's ghee q.s., to be administered for seven days to relieve the poisoning symptoms of sulphur.

FEW AYURVEDIC PREPARATIONS, WHOSE ACTION
DEPEND ON THE CORRECTED SULPHUR.

(1) *Gandhakadi Churna* (गन्धकादि चूर्ण)—Corrected sulphur 10, Long pepper 10, Chebulic myrobalans (ripe fruits) 10.

Dose— $\frac{1}{4}$ tola or 45 grs. with Milk.

Indications—Habitual constipation and piles.

(2) *Gandhakadi Vati (Pills)* (गन्धकादि वटी)—Corrected sulphur 3, Rock salts 1, Garlic 1, Ginger-root 1, Black round pepper 1, Jiraka 1, (Fried) Asafoetida 1. Rub all the ingredients in a stone mortar with lemon juice and prepare a pill mass. Divide the mass into pills of 2 to 4 grains each.

Dose—12 to 24 grs.

Indications—Indigestion, colic, etc.

(3) *Shinhanad Guggul* (सिंहनाद गुग्गुलु)—Corrected sulphur 8, Decoction of Triphala 12, Castor oil 32.

Directions—Put the ingredients in an iron vessel and boil it till it assumes the shape of a pill mass. Divide the mass into pills of 4 grains each.

Dose— $\frac{1}{4}$ tola or 45 grs.

Indications.—Rheumatism and nervous derangements.

(4) *Gandhaka Rasayan* (गन्धक रसायण)—Take corrected sulphur 1 lb. and give "Bhabnas" (i. e. soaking and drying in sunshine for a number of times) of the following drugs for eight times in each viz (1) Cow's milk (2) Decoction of Cinnamon bark (3) Decoction of Cardamom seeds (4) Decoction of Tamal patram (5) Decoction of Guduchi (6) Decoction of Triphala (5) Juice of Bhingaraj. Take out the sulphur thus prepared and rub it to a fine powder.

Directions—Rub this sulphur with ginger-root juice in a stone mortar and prepare a pill mass. Divide the mass into pills of 4 grains each. **Dose**—12 to 24 grs.

Indications—Phthisis, leprosy and skin diseases.

(4) *Gandhaka Ghrita* (गन्धक घृत)—Corrected sulphur 1 lb. Buffaloe's milk 20 lbs. Boil milk so as to melt sulphur. Add whey to this milk in sufficient quantity so as to prepare curd.

Prepare butter and ghee out of this curd. Ghee, prepared in this way, is either known as ghrita or Taila in Ayurveda. It is used internally as well as externally.

Dose— $\frac{1}{2}$ tola or 45 grs.

Anupan—Cow's milk or betel-leaf.

Indications—Phthisis, leprosy and skin diseases.

(5) *Gandhakadi Taila* (गन्धकादि तैल)—Corrected sulphur 1, Purified copper sulphate 1, Corrected Realgar 1.

Directions—Powder and Mix. Take a fruit of Kanaka Dhutura and fill in it sufficient quantity of the above mixture. Do Kapadmati to this fruit and roast it in gentle fire as in Putapaka process. Afterwards rub the fruit with the drug inside in a stone mortar with sweet oil (sesamom oil) in sufficient quantity. Filter this oil and bottle it up. This oil is used as an external application in many diseases with marked benefit.

Indications.—Rheumatism, Leprosy and skin diseases.

Therapeutics.—In combination with mercury it is used in all diseases. It readily combines with and fixes metallic mercury and is extensively used as such as *sulphide of mercury* (Red Black varieties) as described before.

Externally :—Skin—sulphur has got an antiseptic and parasiticide action on the broken as well as on the unbroken skin ; and hence, Gandhakadi taila and Gandhaka Ghrita are used as external application to cure many skin diseases, e.g., Ringworm, Scabies, Tinea Capites, Leprosy, Eczema etc. Gandhakadi Taila, Ghrita, is also used to promote healing of an ulcerated surface, and for this purpose it is used as a dressing. It has got a specific action on the germs of scabies.

Lungs—The fumes of sulphur are antispasmodic and hence they are used to relieve whooping cough and asthma.

Gastro-intestinal tract—It is a gastric stimulant which improves appetite and digestion. Hence it is administered in indigestion. It is a cholagogue, laxative and vermifuge and is prescribed in colic, diarrhoea, flatulence, congestion of liver, piles and cholera. The Ayurvedic preparations known as Kraviyada Rasa or Gandhakadi-Vati is selected with proper anupan in the above

mentioned complaints. Corrected sulphur with confection of Roses (Gulkand, q.v.) or Gandhaka Rasayan done in Bhringaraj juice, with proper anupan, is prescribed in piles with marked success.

Blood—It is an alterative and tonic and hence it is known as Rasayan in Ayurveda. Corrected sulphur in medicinal doses with proper anupan, or Gandhaka Rasayan is prescribed to improve the vicious condition of blood in many skin diseases e.g. Ring-worm, Scabies, Eczema, Leprosy etc.

Malaria—Corrected sulphur with proper anupan in medicinal doses, is useful in malarial attacks. Labourers in sulphur mines do not suffer from malaria and hence it is of service in malaria.

Therapeutic uses of Sulphur with their different Anupans :—

Corrected sulphur	with Triphala churna	In skin diseases.
Do	with Neem-bark or leaves churna	In Leprosy.
Do	with Trikatu-churna and Ghee	In Bronchitis.
Do	with the Decoction of Kalmegh (Brihati or Kantakari)	In Bronchitis and Asthma
Do	with Long pepper churna and honey	In Laryngitis.
Do	with embellic myrobalans churna	In Dyspepsia.
Do	with betel-leaf	In Intestinal colic.
Do	with ginger-root-churna and ghee	In Sprue. In Jaundice and congestion of liver.
Do	with Bhringaraj-churna and ghee	
Do	with confection of Roses (Gulkand)	In Piles
Do	with the juice of Tulsi (Holy Basil)	In nerve derangements.

MICA

=अम्र =

Verh. Sans.—Abhra. **Eng.**—Talc. **Hind.**—Avrak. **Guz.** & **Mah.**—Hingool.

Source.—It is found chiefly in mountains. In India it is found chiefly in the districts of Nellore and Hazaribagh and in the hills of Central Provinces and Rajputana.

Varieties—Broadly speaking, there are two varieties of mica (1) Muscovite or Potash mica, generally pale in colour and (2) Phlegopite and Biotite, the magnesian or Ferro-magnesian micas, usually of dark colour and transparent only in their scales.

The black variety or कृष्णाभ्र is generally used in the preparations of Ayurvedic medicines. In this variety some portion of the aluminium, is replaced by iron and it is this iron, that imparts the black colour to the mica and consequently iron occurs in the incinerated products.

Correction.—It is first heated and washed in milk. The plates are then separated and soaked in the juice of *Amaranthus polygamus* (*Kantanatia*) and कान्जिका for eight days.

Preparation of Bhasma.—Talc thus treated is reduced to powder by being rubbed with paddy within a thick piece of cloth, when the powdered talc passes through the pores of the cloth in fine particles and is collected for use. Talc, thus reduced to powder, is called *Dhanyabhraṇa*. (धान्याभ्रक). It is prepared for medicinal use by being mixed with cow's urine and exposed to a high degree of heat within a closed crucible, repeatedly for a hundred times and is known as *Sataputita Abhra*. Sometimes the process is repeated thousand times. When this is the case, the preparation is called *Sahasraputa Abhra*.

Prepared talc is a powder of brick-dust colour and saline taste. Chemically it consists of silica, iron, aluminium, potassium and magnesium.

Physiological Action.—Tonic, aphrodisiac. It is said to stimulate metabolic activity of tissue cells generally. Refined talc

is astringent and saline to the taste, cooling, life-prolonging, invigorating and is a specific for derangements of the wind, bile and phlegm. The contained silica helps the natural healing process of the tubercular foci.

Mode of absorption :—The finely powdered Bhāsmā of Mica has to be rubbed with honey (*glucose*) for a considerable time in hard stoneware pestle and mortar and Mica thus treated is converted into a colloidal state which facilitates the passage of the ultra-fine particles through the mucous membrane of the gastro-intestinal tract.

Ultramicroscopic Mica atoms thus absorbed exerts special beneficial action on the metabolism and internal secretion.

Dosa :—3 to 6 grains.

Therapeutics :—The Avra-Bhasma is used alone or with Anupan with marked benefit as stated below.

(1) As an alterative, it is used in enlargement of glands. Dose—2 to 6 grains generally with honey, twice a day.

(2) In tuberculosis it is given in dose of 2 to 3 grs. twice daily with honey and some vehicle as the fresh juice of *Vasaka*. The mica supplies silica to the connective tissue cells and thus helps them to form defensive barrier around the tubercles.

(3) In gonorrhoea, it is given with honey and powdered *Peepul* and turmeric. 3 to 6 grains per dose.

(4) In rheumatism, reduced mica is given with a decoction, prepared from ginger, root bark of *Aplotaxis auriculata*, *clerodendron siphonanthus* and *Withania somnifera* each $\frac{1}{2}$ tola and water 8 ounces, reduced by boiling to 2 ounces.

Adult dose :—2 ounces.

Here are a few Ayurvedic preparations, whose action depends on reduced Mica.

(1) *Jvara'sani Rasa* (ज्वराशनि रस)—Take of mercury, sulphur, rock salt, aconite and copper, one part each, prepared iron and talc, five parts each, rub together with the juice of *Vitex Negundo* (निर्गुण्डि) leaves, then add one part of black pepper and make into 1 grain pill. They are administered with the juice of betel leaves in chronic fever and enlarged spleen.

(2) *Agnikūmara Rasa* (अग्निकुमार रस)—Take of mercury, sulphur, borax, iron, aconite, ginger, long pepper, black pepper, *ajowan* and opium each one part, prepared talc ten parts, rub together for three hours with the decoction of *Plumbago rosea* (*raṭṭa chitraṭṭa*) and make into pills of the size of black pepper. This preparation is used in chronic diarrhoea and indigestion.

(3) *Brihat Sringarabhra* (बृहद्-शृङ्गाराभ्र)—Take of mercury, sulphur, borax, flowers of *Mesua farea* (*Nagaṭṭesara*), camphor, cloves, leaves called *tejpatra*, seeds of *Datura*, each 2 tollas, prepared talc eight parts, *Abies webbiana*, *cyperus rotundus*, *Aplotaxis Auriculata* (*ṭushitha*), *Jatamansia* root, cinnamon, flowers of *Woodfordia floribunda* (*dhataṭṭi*), *triphalā*, *triṭṭatu* and *pothos officinalis* (*gajapippuli*) each four tolas. Powder the ingredients, mix and rub with the decoction of *Piper longum*. Make into 2 grain pills, to be given well rubbed with honey and juice of Betel leaves.

(4) *Sri Mohalakṣhmi bil'asa Rasa* (श्रीमहालक्ष्मी विलास रस)—Take of talc eight tola's, mercury four tola's, sulphur four tolas, tin two tolas, silver one tola, orpiment one tola, copper half a tola, gold half a tola, camphor, nutmegs and mace, each four tola's, seeds of *Argyrea speciosa* (*bridhadaraṭṭa*) and of *datura*, two tolas each. Mix together, rub with the juice of betel leaves and make into pills of about two grains each.

Therapeutics.—(1) *Abhra Bhasma* is given in anaemia, jaundice, chronic fever, enlarged spleen, as the preparation, *Jvarasani rasa* is used in chronic fever and enlarged spleen.

(2) It is used in chronic diarrhoea and dysentery as the preparation, *Agnikūmara Rasa* is used in chronic diarrhoea and dysentery.

(3) *Brihat Sringarabhra* is used in lung troubles, phthisis and chronic bronchitis &c.

(4) In general debility and impotence, the preparation *Shri Mhalakṣhmi bilasa rasa* is used with marked benefit.

FERRUM.

=लोह=

Vern.—*Lat.*—Ferrum. *Sans.*—Lauha. *Beng.*—Loha. *Guz.*—Lodhun. *Tam.*—Irimbu. *Tel.*—Inumu.

Source.—Rarely met with free in nature. It is found, combined with oxygen, as haematite in rocks, magnetic iron ores etc. ; with sulphur as iron pyrites and as carbonate of iron. It occurs in the red corpuscles of the blood of animals, bile, gastric juice, lymph, milk, pigment of the eye and in the urine.

Correction.—It is first of all beaten into thin plates, which are then heated in fire and when red-hot, plunged into the following liquids, one at a time :—oil, whey (ghol), conjee, cow's urine and a decoction of *kulattha kalai* (*Dolichos uniflorus*). This is repeated three times in succession.

Preparation of Lauha Bhasma.—The plates are reduced to powder by pounding them in an iron mortar, rubbing them with cow's urine and roasting the powder in a covered crucible repeatedly, till it is reduced to a fine impalpable powder, that will float on water and will not irritate the eyes when applied to them. Iron rubbed with cow's urine and roasted about a hundred times, is called *Sataputita Lauha*. Iron similarly roasted thousand times is called *Sahasra-putita Lauha*.

Properties of Iron as directed in Ayurvedic literature—Iron is bitter, astringent and sweet to the taste. It is a laxative it is cooling, it increases longevity, it is good for the eye-sight ; it reduces obesity, it improves the "wind", it cures the affections of phlegm and bile it is an antidote to poison, it cures colic, ascites, piles, spleen, jaundice, obesity, gonorrhoea, worms and leprosy.

Physiological Action.—

Blood.—Iron improves the quality of the blood.

Gastro-Intestinal Tract :—Iron produces constipation and this is why it is recommended to be administered with *Triphala* powder.

Metabolism :—Iron stimulates the functional activity of all the organs of the body and is therefore a valuable general tonic. *Lauha Bhasma* is a powerful alterative, astringent, tonic and restorative.

Mode of absorption—The finely powdered Bhasma of Iron (Ferrum & Ferric oxide) is rubbed with honey for a considerable time in hard stone pestle and mortar and Iron Oxide thus treated is converted into a colloidal state, which facilitates the passage of the ultrafine particles through the mucous membrane of the gastro-intestinal tract. Ultra-microscopic Iron atoms, thus absorbed exert special beneficial action on the blood corpuscle, whose haemoglobin content, they increase and thus gives more strength and vitality to the constitution.

Dose :—3 to 6 grains. Used in different diseases with different Anupans.

Therapeutics.—*Externally*.—The only external use of iron is as an ingredient of hair dyes.

R/-

Iron	2	Tolas
Mango Stones	2	„
Chebulic Myrobalans	2	„
Embelic	2	„
Belleric	1	„

Rub these together with water in an iron vessel and steep for one night. This paste is applied to grey hair for turning them into black.

Internally :—

Blood :—As a haematinic tonic, iron is very useful and is used in many diseases,

(a) **Anaemia and chlorosis** :—Iron is of great value in both simple and secondary anaemias. The benefit is specially marked in cases of chlorosis and in anaemia caused by malaria, Kala-azar etc.

Among the various preparations, *Navayasa Lauha* is very useful and is very commonly used in all forms of anaemia.

(b) In secondary anaemia from chronic intermittent fever

Iron is very useful adjuvant to anti-pyretic drugs. *Brihat-Sarvajvara-hara Lauha*, *Putā Paṭṭa Bisama Jwarantaka Lauha* are well known preparations containing iron and are commonly used.

(c) In anaemia associated with enlarged liver—*Jakridari Lauha* is used with success.

(d) In leucorrhoea—As protracted discharges debilitate the patient and leads to anaemia, preparations containing iron are useful in such cases.

(e) Bright's diseases—Iron is a valuable remedy in Bright's diseases and not only cures the anaemia but also lessens the albumin. It is usually prescribed with *yavaṭṭshara*.

(f) In chronic dyspepsia with anaemia.

(g) Scrofula and Tuberculosis.

(h) In anaemia due to intestinal worms.

(i) In microbic diseases—Iron is of great value when given internally e. g. erysipelas, carbuncle, farunculosis.

(j) In nervous diseases—Iron indirectly influences the nervous system by improving the nutrition and the general functions of the organs.

What to Avoid—The patient taking iron reduced to ashes should eschew the following—articles fried in Ghee or oils, oil of the *til* seed, Dal, mustard seed, liquors and acids.

A few Ayurvedic preparations whose action depend partly on the purified iron.

(1) *Vrihat-sarvajvara hara Lauha* (बृहत्-सर्वज्वर हर लौह)—Take of purified mercury and sulphur, prepared copper, iron pyrites, talc, gold and orpiment, each two tola's, prepared iron eight tola's, mix them together, and soak the mixture for seven days, in each of the following fluids, viz., fresh juice of the leaves of *Morordica charantia* (*ka'ravella*), decoction of *dasamula* or ten roots, decoction of *parpata*, and of the three myrobalans, fresh juice of *guruchi* (*Tinospora cordifolia*), of betel leaves, of *kakamachi* (*Solanum nigrum*), of *nirgundi* (*Vitex Negundo*), of *punarnava* (*Boerhaavia diffusa*) and of ginger.

Dose.—2 grains. Administer with long pepper and treacle. The dose may be gradually increased,

Indications.—All sorts of intermittent fevers, in emaciation, wasting, hectic fever, enlarged spleen, anaemia, loss of appetite etc.

(2) *Putā Pa'k Vishomajvara'ntaka Lauha* (पुटपाक विषमज्वरान्तक लौह)—Take of mercury obtained by sublimation, of cinnabar, and sulphur, each one tola'. Rub them together and make it into *Rasaparpali*. Then take of prepared gold, one quarter of a tola, prepared iron, copper, and talc, two tola's each, prepared tin, red ochre, and corals, half a tola' each, roasted pearls, conch-shell and bi-valve shell, each a quarter of a tola'. Beat all these ingredients together into a mass with the aid of water. Inclose the mass within bi-valve shells, cover the shells with a layer of clay and roast them lightly in cow-dung fire.

Dose—2 grains with the addition of long pepper, rock salt, assafoetida and a little honey. It is taken once daily in the morning.

Indications.—Chronic fever, spleen and liver diseases etc.

3 *Jakridari Lauha* (यकृदरि लौह)—Take of prepared iron, talc and copper, each four tola's, root of *Citrus Bergamia* (*limpaka'*) eight tola's, burnt deer-skin eight tola's, rub them together with water and prepare a pill-mass.

Dose.—9 to 18 grains.

Indications.—Enlarged liver, spleen, jaundice etc.

(4) *Tryushana'di lauha* (तृषणादि लौह)—Take of *yavaḥsha'ra* (impure carbonate of potash), ginger, long pepper and black pepper, one part each, iron four parts.

Dose.—6 grains pills with water.

Indications.—In Bright's disease.

(5) *Nava'yasa Lauha* (नवायास लौह)—Take of ginger, long pepper, the three myrobalans, *babering* seeds, tubers of *cyperus rotundus* (*mustaka*) and plumbago root, each one part, prepared iron nine parts, powder the ingredients and mix.

Dose.—4 grains, gradually increased to sixteen grains, to be taken with honey and *ghee*.

Indications.—In all forms of anaemia.

SULPHATE OF IRON.

(*Ferrous Sulphas*)

=हीराकस=

Vern. Sans.—Kasisa. *Beng.*—Hirakash. *Eng.*—Iron sulphate. *Fr.*—Sulphate Ferreux. *Madras.*—Annabhedi. *Hind.*—Hara-kasus, Kashis *Tel.*—Tagramu.

Source.—It can be obtained by dissolving iron wires in sulphuric acid by the aid of heat. It occurs in pale, bluish green oblique rhombic prisms.

Physiological Action.—It is a valuable haematinic, tonic, astringent and emmenagogue, and an adjunct to purgatives. Externally astringent and styptic.

Dose.— $\frac{1}{4}$ to 2 grains twice a day with honey and milk along with *triphalā* powder and pepper.

Therapeutics.—*Externally.*—Iron sulphate was frequently used as an external application.

(1) In spreading erysipelas.

R/- Iron sulphate—10 grains.

Spirit of wine or Aqua—1 oz.

This solution is to be applied with a camel hair brush over the reddened area of the skin and allowed to dry on. The application is to be repeated once a day only until the redness disappears. The part should be covered with sterile cotton wool to exclude air.

(2) In various skin diseases such as intertrigo, pruritus etc.

Chakradatta recommends the following :—

R/- Iron sulphate—

Gorochona (Gallstone of cows).

Rusot (Barberry root)

Orpiment.

Equal parts of the above to be beaten into a paste with *kanjika*. To be used as an external application.

(3) *Kasisa'dyataila* (काशीचाय तैल)—Take of sesamum oil four seers, water sixteen seers, sulphate of iron, wood of *Withania Somnifera* (asvagandha'), bark of *Symplocos racemosa* (lodhra),

root of *Pothos officinalis* (*Gajapippali*) each sixteen tola's. Beat the solid ingredients into a paste and boil it with the oil and water. This oil is recommended to be applied to the genitals and the breasts with a view to strengthening these parts.

Internally.—

Chakradatta recommends linctus composed of sulphate of iron and pulp of wood apple, in hiccough, which is probably the only instance of internal use of this drug in ancient works of Ayurveda.

Iron sulphate is however useful in all diseases, wherever iron is indicated.

The following prescriptions are valuable in anaemia and debility :—

(1) R/- Ferri Sulphate (*kasisa*)—1 gr.

Inf. Chiretta—1 oz.

Mix. One such to be taken thrice a day after food.

(2) R/- Ferri Sulph—24 grains.

Cinnamon powder (*Dalchini*).

Black pepper (*Kala marich*)—30 grs.

Honey—q.s.

Divide into 12 pills. One to be taken twice daily.

MANDOOR

(*Ferro-Ferric Oxide*)

=मण्डूर=

Vern. Sans.—Manduram. **Eng.**—Iron rust. **Bom.**—Loheka janga. **Hind.**—Lohaka Zang. **Beng.**—Lohar-gu, Maricha' **Tel.**—Innupa chittumu. **Tam.**—Irumboo chittam.

Source.—The black forge-scales which collect around the blacksmith's anvil are called mandura.

Correction.—The Forge-scales are allowed to remain exposed to air till they become very rusty and brittle. They are

then powdered finely. Thus powdered, these rusts of iron are rubbed with cow's urine and roasted in a covered crucible till they are reduced to a fine powder.

Physiological Action.—The properties of Mandura are said to be similar to those of iron. "The qualities which reside in killed iron are also to be found in the rust of iron." (Rasaratna Samucchaya.)'

Dose. 2 to 6 grains.

Preparations, whose action depend on the properties of Mandura

(1) *Gura Mandura*. (गुड़मण्डूर)—Take of iron rust 3 parts, Embelic and chebulic Myrobalans, and old treacle each 1 part. These are rubbed together with honey and ghee and are made into boluses. To be taken in divided doses. before, along with and after meals (*Bhavaprakash.*)

(2) *Punarnav'adi mandur* (पुनर्नवादि मण्डूर)—Take of *Boerhaavia diffusa* (*punarnava'*), *Ipomoea Turpethum* (*trivrit*), ginger, long pepper, black pepper, *ba'berang* seeds, *devada'ru* wood, plumbago root, *patchak* root, the three myrobalans, turmeric, wood of *Berberis Asiatica* (*daruharidra*), root of *Baliospermum montanum* (*danti*), *Piper chaba* (*chavika*), *indrajaya* seeds, root of *Picrorrhiza Kurroa* (*Katuki*), long pepper roots and the tubers of *cyperus rotundus* (*Mustaka*) one tola each, iron rust 40 tollas ; mix them together and boil the mixed powder in 5 seers of cow's urine till the watery part is evaporated. Dose, about 8 grains. It is used in ascites, jaundice, painful dyspepsia with diarrhoea. This is specific in the contradictory condition of Dropsy with Diarrhoea.

Therapeutics, (1) In anaemia, amenorrhoea, dysmenorrhoea, menorrhagia and chlorosis.

(2) In diarrhoea and dyspepsia as the preparation *Gura Mandura*. is used for dyspepsia with pain after taking food.

(3) Neuralgia of the 5th nerve due to debility.

(4) Kidney diseases, albuminuria.

SVARNA-MAKSHIKA

(*Ferri Sulphuretum.*)

= स्वर्णमाक्षिक =

Vern. Sans.—Svarnamakshika. **Eng.**—Iron pyrites. **Hind. & Bom.**—Sonamukhi. **Guz.**—Sanainukhi-naganṭha.

Source.—Iron pyrites are found in many parts of India in form of *Svarna makshika* and *Taramakshika*. It is so called because it contains a small element of Svarna (Gold) in its composition. It possesses the virtues of gold to a certain extent. It also contains elements of other metals, and therefore possesses the virtues of those metals as well.

Correction.—Take of Svarna Makshika three parts and of rock salt one part, put on fire on an iron vessel after mixing them up with lemon juice ; stir up constantly with a ladle, until the vessel looks red, when take the contents down.

Preparation of Vasma.—Pound the metal with the decoction of kulatha kalaya and put it on *puta pakā* with oil, whey or the goat's urine.

Physiological Action.—Tonic, alterative.

Dose.—2 to 6 grains with honey.

Preparation, whose action depends on the properties of Iron pyrites.

Garbhavinoda rasa. (गर्भविनोद रस)—Take of iron pyrites and cinnabar, each four tola's, ginger, long pepper and black pepper, each three tola's, cloves and mace, each six tola's, beat them together with water and divide into pills about four grains each. One pill to be taken twice daily.

Therapeutics.—(1) In anaemia and chlorosis :—

R/-

Iron pyrites (स्वर्णमाक्षिक) 5 parts

Prepared Iron (लोहभस्म)

Sesamum seeds (तिल)

Long pepper (पिप्पली)

Note.—*Putā pakā* means— roasted in a closed crucible.

Black pepper (मरिच)

Ginger (आद्रक) aa 1 part

Honey (मधु) q.s.

Beat into a mass with honey.

Dose,— $\frac{1}{2}$ to 1 dram in advanced anaemia.

(2) *Garbhavinoda rasa* is used as an alterative tonic in diseases of pregnancy.

(3) It is useful in anaemia, urinary diseases, ascites, anasarca, prurigo, eye diseases etc.

WHITE ARSENIC

(*Arsenious Acid*)

=शङ्खविष=

Vern. Sans.—Sankha Visha, Darumuch, Sa'mbala Ksha'ra.
Beng.—Senko. **Hind.**—Sankoia. **Eng.**—White arsenic, Arsenious acid.

Sources.—It is found in arsenical ores as arsenates of iron, nickel or cobalt. It is obtained by roasting certain arsenical ores.

Correction.—It is purified by being soaked in lemon juice or the juice of the plantain tree. The process of rubbing it in a stone mortar with lemon juice and drying it in sun's rays should be repeated for three times. Dr. H. C. Sen's method consists in boiling the powdered arsenic tied in a cloth for about 3 hours in milk on a slow fire and subliming it in a closed vessel. This boiling in milk is said to mitigate its action.

Physiological Action.—

External : Skin.—Arsenic has got no action on the unbroken skin, but it is a powerful irritant and caustic on the denuded or the broken skin.

Internal : Alimentary tract.—In medicinal doses it stimulates the gastric juices and improves the appetite but in large doses or the poisonous doses,, it is a powerful gastro-intestinal irritant, i.e.,

it causes vomiting, purging, colicky pain and bleeding from intestines etc.

Blood.—It is quickly absorbed, and has got some specific action on the parasites in blood e.g. *spirochaetae pallida*, T.B. bacilli and malarial parasites etc. It increases the red blood cells.

Heart and circulation.—In medicinal doses, it stimulates the heart and circulation.

Lungs.—It is stimulant expectorant, antispasmodic.

Nervous system.—In medicinal doses, it acts as a nervine tonic and in large or poisonous doses, it diminishes the sensibility and reflex excitability of the nerves.

Elimination.—It is slowly eliminated from the system, and it has got a cumulative action. It is eliminated through the sweat-glands of the skin. It causes itching and eruptions on the skin, when taken as a poison.

Metabolism.—Arsenic stimulates the general metabolism of all organs and tissues, and it alters the activity of the system in such a way, that many abnormal conditions of body, due to faulty nutrition, are benefited by it. On account of this action of arsenic, it is alterative and a general tonic. In the liver it reduces the formation of glycogen in medicinal doses, and if continued for a long time in a high doses, it causes fatty degeneration of the liver and many other organs.

Specific action.—It has got a specific action on the *spirochaetae pallida*, the causative organism in syphilis. It improves the quality and quantity of blood in syphilis.

Dose :— $\frac{1}{4}$ to $\frac{1}{8}$ gr.

Therapeutics.—

(1) **Alimentary tracts.**—In medicinal doses, it increases the digestive juices and hence it is used in indigestion and dyspepsia. It is not known to have been used singly for these complaints.

(2) **Blood.**—It kills many parasites e.g. T.B., Bacilli Leprosy and hence it is used in Tuberculosis of the lungs, Leprosy, Relapsing fever, rat bite fever etc.

(3) It is an antipyretic and antiperiodic and so it is used to reduce any pyrexia. It improves the quality and quantity of

blood and hence it is used in anaemia, either primary, pernicious, or secondary. It is an alterative and tonic. Reduced arsenic with proper anupan is used to cure many skin diseases e.g., Leprosy, Psoriasis, Ringworm and eczema.

(4) *Specific action*.—It is an alterative and tonic and has got a specific action on the *spirochaetae pallida*, the causative organism of syphilis. Therefore it is used with success in primary, secondary and tertiary stages of syphilis with success.

(5) *Lungs*.—It is stimulant expectorant, tonic and antispasmodic and hence reduced arsenic in medicinal doses with proper anupan is used in Phthisis and asthma.

(6) *Nervous system*.—In medicinal doses, it stimulates the nerve function which has been diseased by the poison of syphilis. It is used in Locomotor ataxy and many other paralytic diseases, resulting from syphilitic poison with benefit, if continued for a long time.

(7) *Metabolism*.—Arsenic diminishes the glycogenic function of the liver. It reduces the amount of sugar and improves the anaemia caused by diabetes mellitus.

(8) Dr. H. C. Sen says that the use of arsenic (prepared in Ayurvedic method) with the three myrobalans or simply chebulic myrobalans or any other mild purgative to prevent its cumulative action is sufficient to save the villages from dyspepsia or malaria.

(9) Enlarged lymphatic glands often yield under its treatment.

(10) By its use obesity is cured.

(11) In very bad cases of diarrhoea with anasarca, minute doses of arsenic with opium are administered with great benefit ; but salt and water are stopped altogether until the patient is fairly convalescent.—(H. C. Sen.)

RED ORPIMENT

(*Bisulphuret of Arsenic*)

= मन्ःशिला =

Vern. Sans.—Manashila. **Beng.**—Mon-chhal. **Eng.**—Realgar or Red orpiment. **Fr.**—Sulphure rouged arsenic. **Ger.**—Arsensulphur.

Source—It is artificially prepared by fusing arsenious acid 5 parts with sulphur 3 parts.

Correction.—Roast realgar with goat's urine for three days in the Dola yantra or soak realgar into goat's bile seven times. Either process will refine it.

Physiological Action.—Alterative, febrifuge and tonic. Refined realgar increases the beauty of the complexion. It reduces corpulency. It tastes pungent and bitter. It is heavy in weight and cooling in effect. It cures the effects of poison and possession by spirit, affection of the phelgm and blood, cough and asthma.

Dose :—2 to 4 grains.

Therapeutics.—Locally it is applied to fistulous sores.

(2) In fever, it is generally used in combination with mercury, orpiment etc.

(3) The preparation *Sva'sa kuthara rasa* (श्वास कुठार रस) is used in asthma with cough, and in remittent fever with cerebral complications. In coma from remittent fever, these pills are powdered and used as snuff for rousing the patient. They are also used in this manner in cephalgia, hemicrania, ozaena etc. Realgar mixed with the ashes of a *Achyranthes aspera* (*apa'm'arga*) is applied to patches of leucoderma or white lepra.

(4) In leprous ulcers a liniment composed of realgar, orpiment, black pepper, sesamum oil and the juice of *Calotropis gigantea* is used.

(5) *Chadraprabha' varti* (चन्द्रप्रभावर्ती)—which contains realgar, is applied to the eyes as a collyrium in affections of the internal tunics, tumors or other growths, night blindness etc.

A few preparations, whose action mainly depend on the properties of realgar :—

(1) *Chandesvara rasa* (चाण्डेश्वर रस)—Take of realgar, mercury, sulphur, and aconite, equal parts ; soak in the juice of *Vitex Negundo* (*Nirgundi*), and of fresh ginger, three times respectively and make into two-grain pills.

(2) *Sva'sa kuthara rasa* (श्वास कुठार रस)—Take of realgar mercury, sulphur, aconite, borax, each one part, black pepper seven parts, ginger and long pepper, three parts each, rub them together with water and make into four-grain pills.

Chandraprabha varti (चन्द्रप्रभावर्त्ति)—Take of realgar, galena, conch-shell lime, seeds of *Moringa pterygosperma* (*sveta maricha*) long pepper, liquorice and the kernel of belleric myrobalan, equal parts, rub them together with goat's milk, dry the mixture and make into small pastils or pencils.

—0—

YELLOW ORPIMENT

=हरिताल=

(*Trisulphuret of Arsenic*)

Vern.—*Sans, Mah. Beng.*—Haritala. *Eng.*—Orpiment, yellow sulphuret of Arsenic. *Hind.*—Haratala. *Guz.*—Aratal., *Tam.*—Arridaram. *Tel.*—Daddipashanum.

Source.—Found native in China and Persia.

Varieties.—Orpiment occurs in two forms, namely, in smooth shining gold-coloured scales called *Vansapatri haritala*, and in yellow opaque masses called *Pinda ha'ritala*. *Vansapatri haritala* is preferred for internal use.

Correction.—Haritala is purified for internal use by being successively boiled in *ka'njika*, the juice of the fruit of *Benincasa Cerifera* (*kushma'nda*), sesamum oil, and a decoction of the three myrobalans, for three hours in each fluid.

Physiological Action.—It is externally used as depilatory. Internally it is alterative, febrifuge. It is said to cure skin diseases, increase strength and beauty and to prolong life.

Dose.—1 to 2 grains.

Therapeutics.—

(1) Orpiment forms an ingredient of several external applications for skin diseases.

(2) As a depilatory, it is applied with water to the part from which the hair is to be removed.

(3) In fever, it is used in combination with mercury, aconite etc.

Preparations, whose action depend on the properties of Orpiment.

(1) *Vetala rasa* (वेताल रस)—Take of purified mercury, sulphur, orpiment, aconite and black pepper, equal parts. First rub the mercury and sulphur together, then add the other ingredients in fine powder, and make into one-grain pills

Indications.—They are given with the juice of fresh ginger in remittent fever with affection of the brain.

(2) *Vidyadhara rasa* (विद्याधर रस)—Take of mercury, sulphur, prepared copper, iron pyrites, realgar and orpiment equal parts ; rub them together and soak the mixture in a decoction of long pepper and in the milky juice of *Euphorbia nerifolia*. Make into pills four grains each.

Dose :—2 grains with honey.

Indications :—In enlarged spleen and other enlargements of the abdominal viscera.

(3) *Ta'laṅṣari rasa* (तालकेश्वरी रस)—Take of orpiment, realgar, iron pyrites, mercury, borax, and rock salt, one part each ; sulphur and burnt conch-shell two parts each, rub them together for a day with lemon juice, then add to the mass one-thirtieth part of its weight of aconite, and mix.

Dose.—3 to 5 grains with butter.

Indications.—In all sorts of chronic skin diseases. After it, powdered seeds of *Vernonia anthelmintica* (*Somaraja*), 2 drs. should be taken with honey and *ghṛe*,

(4) Take of conch-shell lime two parts, orpiment and impure carbonate of soda one part each and realgar half a part. Rub with water and apply.

Indications.—as a depilatory.

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SILA-JATU.

= शिलाजतु =

Vern. *Sans & Beng.*—Shilajatu. *Hind.*—Silajit. *Eng.*—Asphalt or mineral pitch. *Tam.*—Perangyum. *Pers.*—Momiai Faqurul Yayud. *Arab.*—Hajar-ul-musa.

Source—In May and June, owing to the strong heat of the Sun, shilajatu exudes from mountains like the Himalayas, the Vindya chains etc. It may also be obtained from decomposition of vegetable matter on the earth. There are two varieties of *Silajit* (1) *Gomuthra Silajit*, which is dark sticky and has a bitter taste and of a smell resembling cow's stale urine. (2) *Karpoora Silajit* which occurs in white plates. The black variety is the one mostly used in medicine, and Silajatu available at Katmandu (Nepal) is the best and most efficacious.

Chemical Composition—From the report of chemical analysis of *silajit* done in the Calcutta Tropical School, it contains besides gums, albuminoids, traces of resin and fatty acid, a large quantity of benzoic and hippuric acids and their salts.

According to Hooper, it contains

Water	...	9·85 per cent.
Organic matter	...	56·20 per cent.
Mineral matter	...	340·95 per cent.
		100·00
Containing nitrogen	...	1·03 per cent.
Including lime	...	7·80 per cent.
Potash	...	9·07 per cent.
Phosphoric acid	...	0·16 per cent.
Silica	...	1·35 per cent.

From the above report of Mr. Hooper, Dr. Hem Chandra Sen infers that "Shilajatu is a hydrocarbon of bituminous nature. The waxy substance which can be extracted from it with ether or alcohol, and which retains the peculiar odour of the drug, appears to be the active principle. Fire destroys the efficacy of this waxy substance, therefore the Sanskrit writers advise that the pure shilajatu should be extracted with the aid of the Sun's rays. Boiling the solution of shilajatu for hastening the evaporation of water, spoils its therapeutic value."

Correction.—Shilajatu is purified for medicinal purpose by melting it with about four times its bulk of tepid water or milk in an iron pot. This solution is strained through thick cloth and exposed to the Sun, when a black, cream-like substance collects on the surface. This creamy substance is the purified shilajatu. This process is allowed to continue as long as any shilajatu rises on the top of the fluid in the form of cream. If the mixture becomes too thick, lukewarm water is added from time to time, but too much water should not be added at once, for then the cream will not rise to the surface soon. The shilajatu thus collected is dried in the Sun and preserved for use. The dregs at the bottom are thrown away.

Physiological Action.—Locally applied, shilajatu acts as an antiseptic, parasiticide, anodyne, and antiphlogistic. Internally, tonic, slightly laxative, cholagogue, respiratory stimulant, disinfectant and expectorant, diuretic and lithontriptic. R. N. Chopra and J. P. Bose are of opinion that most of the properties ascribed to *silajit* can be explained by the presence of benzoic acid and benzoates which are present in it in large quantities and which they consider is the main active principles of silajit.

Dose.—The dose of shilajatu is to be gradually increased from a minimum dose of two or three grains to one or two drachms or more two or three times a day according to the tolerance of the patient.

Therapeutics.—(1) In various parasitic skin diseases, shilajatu may be used with much benefit.

(2) In sprains and bruises, shilajatu acts as an excellent anodyne and antiphlogistic.

(3) Decoctions and juices of fruits, like lemons and pine-apples, may be preserved for a long time by the addition of shilajatu. The only drawback is that there is a faint smell of shilajatu in the preparation thus preserved.

(4) In small doses it produces much benefit in dyspeptic diarrhoea.

(5) In biliary colic and in jaundice very satisfactory results may be obtained by using this remedy with the decoction of the three myrobalans or of *dashamul*. Water should not be drunk immediately after its administration.

(6) In dyspepsia due to hepatic derangement, this drug is of great efficacy. It is best used in combination with other cholagogues.

(7) In the first stage of infantile cirrhosis of the liver, it is a good plan to use shilajatu with other cholagogues like the juice of the leaves of *andrographis paniculata* (*ka'lmegh*), of *cajanus indicus* (*arhar leaves*), or of *nyctanthes arborescens* (*shephaliḱa leaves*).

(8) In bleeding or painful piles shilajatu is very efficacious for it regulates the action of the liver.

(9) Dr. Hem Chandra Sen writes "By its general alterative property it removes the disorders of the liver and spleen, owing to its beneficial effect on the digestive organs and solar plexus generally. It is very useful in obesity and diabetes". But R. N. Chopra, J. P. Bose of the Calcutta Tropical Medical School give their findings that Silajit has no effect on either the blood-sugar content, or the urine-sugar in diabetes.

(10) Silajit is used by the vaidyas in acute and chronic bronchitis and benzoic acid and benzoates are administered especially for children and to old feeble persons with profuse secretion. It promotes expectoration probably reflexly by causing irritation of the throat and stomach.

(11) In pulmonary phthisis, shilajatu is very useful, owing to its beneficial effect on the digestive and respiratory systems. It

is most suitable for those cases where there is great thirst and burning sensation, as in diabetic phthisis. Owing to its above properties, shilajatu may be used with advantage even in intestinal tuberculosis.

(12) In sexual weakness it is generally administered with *asvagandha* (*withania somnifera*) and other allied drugs.

(13) In chronic gonorrhoea and gleet, shilajatu is used with prepared oxides of tin, lead, silver etc.

(14) In leucorrhoea from debility, it is given with milk or with astringents.

(15) In strangury or painful micturition, shilajatu is used with other diuretics and demulcents like the decoction of *tribulus terrestris* (*gokshura*), *glycyrrhiza glabra*, etc.

(16) As a diuretic and lithontriptic, excellent results are obtained by combining shilajatu with the decoction of *barun*— (*crataeva religiosa*) bark and the following drugs which are collectively known as *panchatrina*. These are the roots of five common-place grasses, viz. (i) Sugarcane, (ii) Shara, (iii) Ka'sha, (iv) Kusha, (v) Ushira.

(17) Shilajatu acts as a laxative and counteracts the bad effects of opium.

Precautions.—While using shilajatu, one should not indulge in excessive quantity of pungent, heating, acid, saline, dry and parched articles of diet : any form or quantity of food which is capable of producing indigestion and acidity should be avoided.

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ALUM.

= फटकिरि =

Vern. Sans.—Sphatikari. **Eng.**—Alum. **Beng.**—Phatkiri.
Hind.—Phitkari.

Source.—Alum as used in medicine is chemically, the double sulphate of aluminium and potassium. It is manufactured locally from Buxite by the chemical manufacturers in Calcutta.

It is obtained in almost pure state only containing traces of iron as impurity, and is generally used as such in medicine.

Physiological Action.—When applied externally alum causes hardening of the skin, or, if used in concentrated solution, exerts a slight caustic effect. Whenever it is brought into contact with albumen, the albumen is coagulated. The *astringent* and *antiseptic* effects of alum depend upon this coagulating property. In larger doses, the *emetic* effect of alum becomes manifest and a *purgative* effect may be seen.

Dose.—Emetic, 2 drams. Purgative, $\frac{1}{2}$ dram.

Therapeutics.—*Externally*—

(1) In catarrhal throat affection alum solution (1 to 5%) is used as an useful gargle.

(2) For the relief of hoarseness or of tickling sensations in the throat, a mixture of equal parts of powdered alum and sugar, placed on the tongue are allowed slowly to dissolve.

(3) In gonorrhoeal ophthalmia alum lotion (4 grs. in 1 oz. of water), is applied.

(4) In granular conjunctivitis, a crystal of alum may be drawn over the involved mucous surface after everting the lid.

(5) In sweating of the hands and feet (hyperidrosis), washing the skin surface with a 0.5% solution of alum will improve the condition.

(6) In gonorrhoea and leucorrhoea alum douche in $\frac{1}{2}$ to 2% solution is beneficial.

(7) In chronic dysentery a 1% solution of alum is used as a rectal injection.

(8) In epistaxis alum solution may be sprayed in, or powdered alum is used as a snuff.

(9) In haemorrhage succeeding upon the extraction of teeth, the packing the cavity tightly with cotton dipped in a saturated solution of alum will arrest the bleeding.

(10) In uterine haemorrhage of all kinds, alum is a useful styptic. It is used as an injection in the strength of 1 dram to the pint.

Internally.—(1) In doses of 1 or 2 drams alum is used as an emetic, especially in the treatment of croup in children.

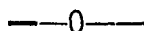
(2) In doses of $\frac{1}{2}$ dram every four hours, alum is given to induce purgation.

(3) *Sweta Parpati* (श्वेतपर्पटी)—which consists of (सोरा) 1 part and alum (फटकरी) 4 parts, mixed and melted on an iron-pan and afterwards the melted mass is allowed to flow on plain surface and congeal as thin white flakes.

Dose.—10 to 20 grains.

It is a good Lithintropic and Diuretic relieving painful micturition and causing free flow of urine.

It is also useful in intestinal toxaemias in small doses ; and acts most beneficially when administered with makaradhwaja. We have used it successfully in various affections of the gastro-intestinal tracts as well as urinary affections.



BORAX.

Vern. Sans.—Tankana. **Eng.**—Borax ; Biborate of Sodium. **Beng.**—Soha'ga. **Hind.**—Tinkal. **Tel.**—Velligaram. **Tam.**—Venharam.

Source.—It is obtained by neutralizing native borax, or by boiling native calcium borate with solution of sodium carbonate. It is brought from Thibet across the Himalaya, and from Nepal. Impure borax is largely imported from Nepal. Borax, as now used, comes from the continent of Europe.

Correction.—It is purified by being steeped for a night in *Kanjika*, and dried in the Sun.

Physiological Action.—Antiseptic, emmenagogue, diuretic ; antacid, local sedative.

Dose.—5 to 15 grains.

Therapeutics.—*Externally*.

(1) It is used for procuring abortion and promoting uterine contractions.

(2) Borax is used as a gargle (grs. 10 to 1 ounce of water) in mercurial salivation and aphthous sores of the mouth.

(3) Borax (1 dr. to water 4 ozs.) removes prurigo of the labia and anus.

(4) In fissures or cracks in the tongue, an application of *Mel Boracis* or *Glycerinum Boracis* (1 in 10) is very useful.;

Internally.—

(1) In small doses it is given to children as a laxative, 1 to 2 grains twice daily.

(2) It is given in loss of appetite, painful dyspepsia, cough, asthma and diarrhoea.

(3) As an internal antiseptic, it is given in foetid diarrhoea of children.

(4) 5 grains of borax and 3 grains of black pepper with a teaspoonful of honey, given thrice a day for bronchitis and asthma in adults.

(5) 5 grains of borax eaten with betel leaves is effective in impotence.

Preparations, whose action depends on the properties of borax.

Amritakalpa rasa (अमृतकल्प रस)—Take of mercury, sulphur and aconite, one part each, borax three parts, soak them for three days in the juice of *wedelia calendulacea* (*bhringaraja*) and make into 2 grain pills. This medicine is useful in loss of appetite, indigestion and dyspepsia.

(2) *Chandramrita rasa* (चन्द्रामृत रस)—Take of the three myrobalans, ginger, long pepper and black pepper, *chavica officinarum* (*chavica*) coriander, cumin seeds and rock salt, each one tola', and rub them together with goat's milk. Then add mercury, sulphur and iron, each two tola's, borax eight tola's and black pepper four tola's, all in fine powder ; mix and make into pills or boluses about ten grains each. They are administered with goat's milk in chronic bronchitis and various sorts of cough with copious expectoration. Along with these pills a decoction made of gulancha, adhatoda vasica (*Va'saka*), clerodendron siphonanthus (*brahmayashti*), *Cyperus rotundus* (*mustaka*) and *solanum Jacquini* (*kantakari*) should be administered.

(3) *Grahanikapa'ta rasa* (ग्रहणी कषाट रस) Take of nutmeg, borax, prepared talc, *datura* seeds, each one part, opium two parts, and make into 2 grain pills with the juice of *Paederia foetida* (*prasa'rani*).

(4) A mixture of equal parts of borax, long pepper and *babering* seeds (in 15 grains doses) is given for five days, at the menstrual periods for the purpose of preventing conception. It is also used for inducing labour pains.

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GOLD.

=स्वर्ण=

Vern. *Sans.*—Suvarna. *Eng.*—Gold. *Hind.*—Sona. *Beng.*—Sona. *Latin.*—Aurum. *Tam.*—Pornu. *Tel.*—Bangarras. **Source.**—It is found commonly alloyed with other metals such as silver, copper, iron etc.

Correction.—It is generally corrected by heating the gold leaves and cooling them alternately in Kanjika (fermented whey), oil, cow's urine, butter-milk and decoction of the gram called kulattha.

Preparation of Swarna Bhasma (स्वर्ण भस्म),—The following is the method described in the *Rasendra Sara Sangraha* (रसेन्द्र सार संग्रह) One part of each of gold and mercury is rubbed together into a mass with lemon juice and placed with two parts of sulphur below and above the mass, inside a covered crucible and exposed to heat with thirty cowdung cakes in the usual manner. This process is to be repeated fourteen times till the gold is reduced to fine impalpable powder, which cannot be made to assume its original standard of gold by any process."

Physiological Action.—Gold and its preparations are nervine tonic, and aphrodisiac emmenagogue and alterative. They are said to increase strength and beauty, improve intellect

and memory, clear the voice and increase sexual powers ; also stimulate the activity of the stomach, and of skin and kidneys causing diaphoresis and diuresis. They also increase the flow of menses in women. In large doses, they act like irritant poison setting up gastro-enteritis with convulsions, cramps, insensibility

Dose.— $\frac{1}{16}$ to $\frac{1}{4}$ gr. etc. The *antidotes* are egg albumen, milk, flour etc.

Therapeutics.—(1) *As a general tonic.* Reduced gold is used in *Ayurveda* as tonic and alterative. The well-known alterative tonic Makardhawaja or Swarna-Sindur is prepared with gold as a catalyser, and the properties of this noble metal are said to become incorporated with Makaradhaja. Gold is also given to feeble infants a few days after birth in the hope that it will impart strength and beauty to the new born.

(2) It is given with the juice of *Punarnava* in loss of eyesight.

(3) It is given in insanity with the powder of dry ginger, black pepper and cloves.

(4) It is used as a rejuvenator with butter, cream of milk or clarified butter.

(5) It is used as a builder of the body and aphrodisiac with milk and sugar-candy powder.

(6) For imparting bloom of health, it is used with saffron.

(7) It is used with *Vacha* as an invigorator of memory.

(8) It is used with the juice of *Bhringaraja* as an alterative.

(9) It is used in heart disease with milk, decoction of bark of *Arjuna* and cane sugar.

(10) It is taken in burning sensation of hands and feet with bile of fish.

(11) In tuberculosis, it is used with juice of *Aya'pan* and garlic or juice of *cactus grandiflorus*.

The following are a few Ayurvedic preparations, whose action depends mainly on the contained reduced gold.

(1) *Jayamangala rasa* (जयमङ्गल रस).—Take of mercury obtained by sublimation (हिङ्गुलोत्थ पारद), of cinnabar, sulphur, borax, prepared copper, tin and iron pyrites, rock-salt, and black

pepper, prepared iron and silver, of each one part, prepared gold two parts, powder them well, mix and soak the mixture three times respectively in the juice of *datura* leaves, and leaves of *Nyctanthes Arbor-tristis* (*Sephalikā'*), in the decoction of the ten roots, called *dasamula* and of chiretta. Divide the mass into 4 grain pills. They are taken with cumin-seed powder and honey. This medicine is used in old chronic fevers of all sorts.

(2) *Mrigankā rasa* (मृगाङ्क रस).—Take of mercury one part, prepared gold one part, sulphur and pearls each two parts, borax one-fourth part, rub them together and beat into a ball with *Kanjikā*. This is dried, enclosed in an earthen crucible and exposed to heat within a pot of rock-salt for twelve hours. When cool, the ball is taken out from the crucible and reduced to powder. It is administered in doses of one to four grains with about a scruple of black pepper in phthisis.

(3) *Swarna Parpati* (स्वर्ण पर्पटी).—Take of mercury eight tola's, gold one tola', rub them together, then add sulphur eight tola's and mix. Melt the mixture over the fire in an iron ladle and place the melted fluid between cow-dung balls enclosed in plantain leaves. This medicine is used in chronic diarrhoea, and anasarca. Dose grains two, gradually increased.

(4) Preparation such as Brihat Somnath Rasa (बृहद् सोमनाथ रस) and Basanta kusumakara Rasa (बसन्त कुसूमाकर रस) are used in diabetes.

(5) Preparation such as Sarbabhauma Rasa (सार्वभौम रस) and Mahalakshmi bilasha rasa (महालक्ष्मीविलास रस) are used in phlegmatic complaints.

(6) Preparations such as Ananda-bhairaba Rasa (आनन्द-भैरव रस) and Brihat Bangeswara Rasa (बृहद् बङ्गेश्वर रस) are used in Gonorrhoea.

(7) Preparations such as Jogendra Rasa (योगेन्द्र रस) and Chintamani Chaturmukha (चिन्तामणि चतुर्मुख) are used in nervous diseases.

(8) The preparation Rasaraj Rasa (रसरज रस) also contains gold and is a good sedative and induces calm refreshing sleep.

COPPER

=ताम्र =

Vern. Sans.—Tamra. **Eng.**—Copper. **Beng.**—Ta'ma'.
Hind.—Tamba. **Fr.**—Cuivre. **Ger.**—Kupfer. **Tam.**—Shembu.
Tel.—Tamberam. **Guz.**—Trambo.

Source.—Found extensively free in the metallic state and also in various combinations as sulphide in copper pyrites and as carbonate, phosphates and arsenate ; with oxygen as cuprous or red oxide and as cupric or black oxide. Copper is found in the districts of Singbhum and Dalbhum (Bengal). In minute quantities, it is found in natural state in human blood, liver and kidney.

Correction.—Copper is purified by being boiled in cow's urine for three hours.

Preparation of ताम्र भस्म—Copper is reduced to powder by smearing its thin leaves with a paste of sulphur and lemon juice, beating them into a mass and exposing to heat in a covered crucible within a sand-bath for twelve hours. Copper so treated, does not contain any soluble salt as sulphate or chloride ; it is entirely insoluble consisting of oxides and sulphides mainly. Amritakaran (अमृतकरण) should be done to render it innocuous and prevent it from causing purging and vomiting when taken internally.

The process of अमृतकरण is the following :—

The powder is rubbed with *Kanjika* and made into a ball, which is introduced into a tuber of *Amorphophallus Campanulatus (ola)*, as in a crucible and roasted.

Physiological Action.—On chemical analysis, ताम्र भस्म is found to consist of sulphide. It is astringent, sedative, antispasmodic, alterative, antiseptic, emetic and purgative. In small doses it is astringent ; in large doses it is alterative and in very large doses it is emetic. Copper is absorbed from the stomach, intestines and mucous membranes probably as a colloid and stored up in the liver, small amounts being found also in the spleen and

kidneys. It is excreted by the liver, kidneys, the salivary and intestinal glands. Colloidal copper increases activity of cell-metabolism.

Dose :—as an alterative, 1 to 2 grs.

Therapeutics.—

(1) In poisoning, prepared copper is given in doses of about 20 grains with sugar or honey to cause vomiting.

(2) In enlargement of the abdominal viscera, designated by the term *gulma*, prepared copper is used in 2 grain doses with ginger juice enclosed in a betel leaf.

(3) *Svachchhanda-bairava rasa* (स्वच्छन्द-भैरव रस)—Take of prepared copper and aconite equal parts, rub together with the juice of *datura* leaves and make into one-grain pill. They are given with ginger juice, sugar and rock-salts. It is used in fevers complicated with cerebral symptoms.

(4) *Suryavarta rasa* (सूर्यावर्त रस)—One part of mercury and one of sulphur are rubbed together with the juice of *Aloe Indica* for six hours. Two parts of copper leaves are pasted with the above mixture, and roasted within a closed crucible in a sand-bath for twelve hours. When cool the copper leaves are taken out from the crucible and powdered. Dose four grains with the addition of honey and the juice of *Adhatoda Vasica* (*Va'saka*). It is used in asthma.

(5) *Hridayarnava rasa* (हृदयार्णव रस)—Take of purified mercury and sulphur, each one part, prepared copper two parts, rub them together for twelve hours with the decoction of the three myrobalans, and with the fresh juice of *Solanum nigrum* (*kā'kama'chi*). Make into pills about four grain each. They are said to be useful in heart diseases.

(6) *Tamresvara* (ताम्रेश्वर)—Take of prepared copper, mercury, borax and iron, sulphur and long pepper, equal parts, soak in the decoction of the leaves, bark, fruit, root and flowers of *Azadirachta Indica* (*nimba*), of the pulp of *Cassia fistula* and of the three myrobalans. Dose, four grains, in skin diseases of various sorts.

SULPHATE OF COPPER.

=तुथ=

Vern. *Sans.*—Tuttha. *Beng and Hind.*—Tutia. *Eng.*—Blue vitriol. *Tam.*—Tuttam turichi.

Source.—It is obtained by the interaction of water, sulphuric acid, and copper or copper oxide.

Correction.—It is purified for internal use by being rubbed with honey and *ghee* and exposed to heat in a crucible. It is then soaked for three days in whey and dried. Copper thus prepared does not produce vomiting. It possesses, to a certain extent, the virtues of copper, as a small amount of copper enters into its composition.

Physiological Action.—*Externally*, it is caustic and local astringent. *Internally*, in small doses, it is astringent and in large doses, it is emetic. In minute doses copper sulphate is absorbed as an albuminate, and is said to act on the body like arsenic. It promotes assimilation and increases strength and flesh. Hence it is **alterative** and **nervine tonic**. During elimination through the intestinal mucous membrane it acts as a **remote astringent**. It is stored in the liver.

Dose :—As an astringent, $\frac{1}{4}$ to 2 grains, as an emetic 5 to 10 grains.

Therapeutics.—(1) *Externally*.

(1) Copper sulphate is used to destroy *exuberant granulations*, and to stimulate *indolent ulcers*.

(2) It is generally applied to *granular lids* and to the edges of the eyelids in *tinea tarsi*.

(3) In the form of a lotion (2 to 4 grains to 1 oz.) it is very serviceable in *sluggish ulcers* and *chancres*.

(4) Copper sulphate is applied to sinuses and fistula-in-ano with the object of stimulating and healing them.

(5) It is added to ointments for foul ulcers.

(6) The compound powder consisting of mercury, sulphur sulphate of copper, cinnabar, and sulphate of iron equal parts is applied to chancres.

Internally

(1) It is chiefly used for its astringent properties in obstinate *dysentery*, and *severe diarrhoea*, especially that of tuberculosis.

(2) For its emetic action, it is occasionally used in narcotic poisoning, and to expel false membranes or mucus from the air-passages in *Diphtheria*, *laryngitis*, *croup* and *bronchitis*.

(3) It is a valuable *anti-dote* in *poisoning* by *phosphorus*.

(4) *Garbhabilāsa rasa* (गर्भविलास रस).—Take of mercury, sulphur and sulphate of copper, each one part. Rub them together with lemon juice for three days. Then put it into the decoction of long pepper, black pepper and ginger and dry. This process should be done three times. Then make into four grain pills. They are used in bowel complaints and indigestion during the puerperal and pregnant state.

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SILVER.

= रौप्य =

Vern. Sans.—Rupya, tara. **Beng.**—Rupa. **Fr.**—Arzgent.
Ger.—Silber. **Hind.**—chandi.

Source.—Found throughout the mineral kingdom in a metallic state often alloyed with other metals, gold, arsenic, copper etc., or combined with sulphur, iodine etc. Silver mines existed in Sind, Agra, Delhi and Lahore. Silver may be artificially produced by a mixture of mercury, sulphur and other substances.

(Dhatoomulla)

Correction.—Roll the silver fine, anneal, and while warm, dip successively into til oil, whey, sour gruel, cow's urine, and the decoction of kulatha Kalaya.

Preparation of रौप्य भस्म—Silver leaves are treated with twice their weight of cinnabar and heated in the subliming apparatus. The mercury rises up and collects in the upper vessel and silver in powder form remains in the lower vessel. Silver thus

prepared is sulphide of silver and not oxide of silver. It contains 84% of silver and 16% of sulphur.

Physiological Action.—Silver *Bhasma* is tonic stimulant and aphrodisiac. Silver is said to be “acidulous, sweet, astringent, cool, demulcent, purgative, emetic, constipative, alleviative of wind and bile”—(N.N Sen Gupta). According to Rasaratna Samuchhaṣya it is “acid-sour in taste, sweet in action, cooling, pungent, destroyer of *vayu* and *kapha*, appetiser, enervator of digestive heat, rejuvenator and nourisher of memory and intelligence.”. The following therapeutic virtues are written by another authority :—The internal use of calcined silver prevents the preponderance of wind. It sharpens the appetite and gives tone to the system. It cures glandular enlargement in the abdomen and dyspepsia. It gives longevity and removes long standing diseases.

Dose—Of the powder, $\frac{1}{8}$ grain.

Therapeutics.—It is generally used in combination with other metals, such as gold, iron etc.

(2) The silver powder is given in combination with stimulant confections and various aphrodisiac medicines.

(3) It is highly recommended in excessive heat in the body, hectic fever, phthisis, chest affections, impotence and seminal weakness ; also in painful and irritable condition of the stomach and intestines, in heart-burn and in chronic diarrhoea, in uterine diseases as leucorrhoea, menorrhagia etc., and in irritability of the uterus.

(4) Silver enters into the composition of several remedies as *Yograj* (योगराज), *Jayamangal Rasa* (जयमङ्गल रस) and *Vrihat vata gajankusha* etc. (बृहद्वात गजाङ्कुश)

(5) As an alterative tonic and aphrodisiac in general debility, impotence etc, a pill known as *Mahalakṣmibilas Rasa* (महालक्ष्मी-विलास रस), is used.

(6) In dyspnoea of phthisis, a preparation known as *Kanchan-abhra Rasa* (काञ्चनाभ्र रस) is recommended.

TIN.

= वङ्ग =

Vern. Sans.—Banga. *Beng.*—Ra'ng. *Hind.*—Ra'ng. *Latin.*—*Stannum Tam.*—Tagaram. *Tel.*—Vendi.

Source.—Rarely met with in a free state ; found as oxide in native plates or tin stone or in combination with sulphur as sulphide. It is abundant in Burma, Tenasserim and Malacca.

Correction.—Tin is melted in fire and then it is corrected by putting it into oil, sour conjee, cow's urine and a decoction of the gram of *Kulattha* three times in each.

Preparation of वङ्ग भस्म—Melt the corrected tin. Then add equal weight of powdered turmeric and *ajowan* and cumin seeds and afterwards the powdered bark of *Tamarindus indica* and *Ficus religiosa* and continuing stirring over fire till the tin is reduced to powder, which is then washed to rid it of vegetable ashes. The resulting product is chemically an oxide of tin with some impurities.

Physiological Action.—Alterative, Tonic, Aphrodisiac and urinary antiseptic.

Dose.—3 to 5 grains twice daily in different diseases with different *Anupans*.

Therapeutics.—

(1) *Banga Bhasma* is recommended by Sarangadhar in urinary diseases. It is usually combined with the juice of *tulasi* leaves.

(2) "Just as a lion kills a horde of elephants so does *Banga* destroy all urinary diseases."—*Rajanighantu*.

(3) *Bangeswara* is a favourite prescription for diabetes and is recommended in *Rasendrasarasangraha*. The formula is given below :—

Re/-	Rasasindura	}	aa gr. ii
.	(Red Sulphide of Mercury)		
	Banga-bhasma		
	(Tin-oxide)		

Dose.—One to be taken daily with honey.

(4) It is used in Spermatorrhoea with nutmeg powder and *ghee*.

(5) It is said to be beneficial in phthisis and is given with turmeric in cases of haemoptysis.

(6) It is used with copper in Asthma.

(7) It, judiciously administered, "improves health, strengthens the organs and nourishes the whole body." *Sarangadhar* recommends it in general weakness. It is thus used as an alterative and tonic.

(8) It is used with the juice of *Apamarga* leaves (*Achyranthus aspera*) in weakened vitality, sexual debility and impotence.

(6) As an aphrodisiac, it is best used combined with musk; the effect is immediate.

(10) In putrid smell in the mouth Vanga is given with camphor.

(11) Reduced Banga is given with either powdered long pepper or with juice of betel leaves in Dyspepsia.

(12) Reduced Banga is prescribed with juice of betel leaves in constipation.

(13) It is used with clarified butter in jaundice.

(14) Reduced Banga has been recommended in skin disease and is given internally with catechu dissolved in water.

(15) Reduced Banga is also recommended in leprosy and prescribed with *Nirgundi* leaves (*Vitex trifolici*).

(16) Recently oxide of tin has been found very useful in the treatment of boils and staphylococcal infections (*Drouin, Paris Med.*; 12 Aug., 1922). It has also given excellent results in *Acne vulgaris*, anthrax and styes.

The few preparations, whose action depends on the properties of tin oxide :—

(1) Preparations such as *Trinetra Rasa* (त्रिनेत्र रस) and *Vangeswara Rasa* (वङ्गेश्वर रस) are used in urinary diseases.

(2) Preparations such as *Basanta-kusumakara Rasa* (वसन्त कुसुमाकर रस), *Soimanath Rasa* (सोमनाथ रस), *Tarakesvara Rasa* (तारकेश्वर रस), and *Hemnath Rasa* (हेमनाथ रस) are used in diabetes.

SVARNA BANGA.

(Bisulphurette of tin)

= स्वर्णवङ्ग =

Vern. Eng.—Mosaic gold.

Preparation.—Take equal parts of mercury, sulphur, tin and sal-ammoniac. First melt tin. Then add mercury with it. Stir it well on fire and take it down. Then add sulphur and sal-ammoniac (निशादल) and rub them together in mortar. Put the mixture in a glass bottle and heat it over a sand bath. The resulting powder is the bisulphuret of tin. It is called Svarna Banga (literally meaning golden tin) from its beautiful golden lustre.

Physiological Action.—It is indicated as a rejuvenator and tonic of high potency, which induces healthy vigour, improves the appetite, increases memory, generates semen of high quality, cures gonorrhoea, spermatorrhoea, leucorrhoea and allied troubles of the generative organs.

Dose.—2 to 4 grains to be mixed with different anupans in different diseases.

Therapeutics.—(1) It is used as a rejuvenator and in impotency with 4 grains of the powdered root of mimosa pudica.

(2) It is used as an appetiser with the water obtained by soaking Amlaki 1 tola powder in 4 oz. water soaked over-night and strained through a linen in the morning.

(3) It is used for memory with the fresh expressed juice of Brahmi leaves.

(4) It is used in gonorrhoea with the juice of the raw turmeric or juice of the leaves of Yagna-dumbur.

(5) It is given in spermatorrhoea with cubeb powder 12 grains.

(6) It is given in leucorrhoea with the decoction of red sandal wood 1 tola powdered, boiled in 8 oz. water reduced to 2 oz. for one dose.

(7) It is given for thinness of semen with the juice of Aswagahdha leaves.

ZINC

दस्ता

Vern. *Sans.*—Yasada, *Beng.*—Dasta. *Hind.*—Jasta. *Guz.*—Jasta. *Tel.*—Kharpar. *Tam.*—Tia.

Source.—Never occurs free in Nature, but exists variously combined with elements to form salts. It exists combined with oxygen as red oxide, with carbon as an impure carbonate, with sulphur as sulphide etc. It is obtained by subliming carbonate or oxide of zinc with charcoal.

Correction.—Melt the zinc on fire and while warm, dip successfully into til oil, whey, sour gruel, cow's urine and the decoction of kulattha kalaī. Repeat the process in each for three times.

Preparation of दस्तामरुम—The process is same as बङ्गभरुम.

Physiological Action.—*Externally*, zinc is astringent and antiseptic. *Internally* also it is astringent, antiseptic, alterative and tonic.

Dose.—2 to 4 grains.

Therapeutics.—(1) Mixed with vaselin it is used externally in boils and skin diseases.

(2) Reduced zinc 1 part and Boric Acid 2 parts mixed together are dusted on eye, to cure conjunctivites, on account of its astringent and antiseptic properties.

(3) It is prescribed in medicinal doses to check night sweats of phthisis and hectic rise of temperature with marked benefit.

(4) It is prescribed in medicinal doses to cure many functional nervous derangements e.g. neurasthenic epilepsy and hysteria, during the interval of a fit.

(5) It is used with benefit to lessen the vaginal or uterine discharges and improves health and thus it is of special service in leucorrhœa.

(6) Zinc *bhasma* is said to be useful in eye-diseases, various forms of debility, urinary disorders, anaemia and asthma.

Therapeutic uses of zinc with its different anupans :—

Reduced zinc	With old ghee	In eye diseases
"	With betel leaf	In gonorrhoea and cystitis.
"	With cloves and Ajwan seeds in powder	In Malaria
"	With jiraka and sugar	In diarrhoea and dysentery
"	With butter	In leucorrhoea and gonorrhoea
"	With Triphala	In Leucorrhoea
"	With ghee	In Phthisis
"	With ghee	In hysteria, epilepsy and neurasthenia
"	With long pepper and honey	In dyspepsia of T. B. patients

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LEAD

= सीसक =

Vern. Sans.—Sisaka. **Beng.**—Sisa. **Guz.**—Sisu. **Hind.**—sisā. **Eng.**—Lead.

Source.—Lead never occurs free in Nature, but is generally met with as sulphide i.e. galena from which it is obtained by roasting. It occurs most frequently a carbonate (*Safeda'*). The red oxide of lead was manufactured by the ancient under the name of *sindura*, which is used by all married Hindu women as a paint on the forehead.

Correction.—In the same process as बङ्गभस्म

or

Another method :—Place a quantity of the juice of the Akanda in an earthen pot. Place on it another earthen pot with a hole ~~cut~~ on its bottom. Pour molten lead into the upper pot, so that the molten metal may drop into the lower pot through the aperture, and mix with the Akanda juice. Melt this mixture and drop it through the aperture into the lower vessel in which a quantity of the Akanda juice has again been put. Repeat the process thrice when the lead will be refined.

Preparation of सीसाभस्म—in the same process as tin,

or by

Another method :—Rub Manoh-sila (मनःशिला) with the juice of betel leaves, coat the lead with this and heat 32 times on *Putā'pā'ka* when the metal will be refined.

Physiological Action.—*Sisa bhasma* is a sedative and astringent, Reduced lead is an oxide. It is haemostatic, aphrodisiac and tonic.

Dose :—2 to 6 grains.

Therapeutics.—(1) Reduced lead in medicinal doses checks digestive juices and bleeding and hence it is prescribed in ulcer of the stomach, duodenal ulcer and typhoid ulceration. It checks chronic diarrhoea either of sprue or tuberculosis.

(2) It is used to check all the symptoms of phthisis e.g. night sweats of phthisis, chronic fever, haemoptysis, tuberculous chronic diarrhoea, chronic cough etc.

(3) It is prescribed with marked success in spermatorrhoea and impotency in 2 to 6 grains with butter.

(4) Calcined lead (3 grains) taken internally cures gonorrhoea of all kinds. (धातुमाला)

Prescribing Hints.—Reduced lead has got a cumulative action and hence strict restrictions are of special value. It should be suspended for 2 days after a course of lead for a week.

The following regime should be observed when reduced lead in any form is being administered.

Foods allowed.—Milk, ghee, butter, eggs and foods rich in proteins.

Foods Prohibited—Acid, saline, pungent, raw, parched, fried, heating articles of food etc.

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DIAMOND.

=हीरक=

Vern. Sans.—Hiraka. **Beng.**—Vajra, Hira. **Hind.**—Hira. **Guz.**—Hiro. **Tel.**—Vajra.

Source.—Obtained from mines, formerly from Golconda, Deccan, now mostly from Johannesburg in South Africa.

Correction.—Introduce the diamond to be corrected into a root of *kantakari* (*Solanum Xanthocarpum*) and hang it in a Dola-yantra. Boil this in a Dola-yantra containing the kvath of kulattha and kvath of koda-dhanya in equal parts for three days. Allow it to cool and wash it.

Preparation of हीरक अम्ल—Take the decoction of kulattha kalaya, assafoetida and Saindhab Lavana in a pot. Put the warmed diamond, which has been heated for an hour on a हारपर, in the pot. If this process is continued twenty one times, the stone will easily be reduced to a fine powder.

Physiological Action.—It is said to be a powerful alterative tonic that improves nutrition, increases the strength and firmness of the body and removes all sorts of diseases. It is a powerful aphrodisiac. It removes the derangements of vata, Pitta, and Kapha and maintains their equilibrium.

Dose.— $\frac{1}{8}$ to $\frac{1}{3}$ gr.

Therapeutics.—(1) It is used with kvath of catechu in leprosy.

(2) It is used with vasaka, long pepper and sugar in chronic bronchitis, Phthisis and Asthma.

(3) It is used with milk and ghee in Phthisis, Spermatorrhoea and Impotency.

(4) It is used with ginger-root-juice and honey in nervine functional derangements e.g, Hysteria and Neurasthenia.

(5) It is used with *kṛvath* of Dashamula in Puerperium,

(6) It is used in impotency, spermatorrhoea, sterility, phthisis and typhoid conditions in doses of $\frac{1}{8}$ to $\frac{1}{3}$ grain with honey, butter, ghee or milk.

(7) Being rasayan, it stops premature old age and lengthens life.

Some preparations, whose action, depends on the properties of diamond ;—

Trailakya chintamani rasa (त्रैलोक्य चिन्तामणि रस)—Take of diamond, gold and pearls, each one part ; iron, talc and *Rasa sindura* four parts each, rub together with juice of Aloe Indica and make into two-grains pills. This medicine is used as an alterative tonic.

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PEARLS.

=मुक्ता=

Vern. Sans.—Mukta'. **Eng**—Pearl. **Beng.**—Mukta. **Tam.**—Muttu. **Tel.**—Mutiamu.

Source.—Found in general molluscs inhabiting shallow seas and sand-banks.

Correction.—Pearls are purified by boiling in the juice of the leaves of *Sesbania aculeata* (Jayanti).

Preparation of मुक्तामणम्—First they are heated, and when warm, are placed into the juice of Aloe Indica, *Natia Sah* and breast milk and this process is repeated 7 times and finally reduced to powder.

Physiological Action.—The powder is said to be highly stimulant, tonic and aphrodisiac. Other medicinal virtues ascribed to pearl are "laxative, sedative, emetic and nutritive."

Pearlash is chiefly carbonate and oxide of lime and is an antacid.

Dose.—2 to 4 grains.

Therapeutics.—(1) *Mukta Bhasma* is given in Tuberculosis and Heart disease.

(2) It is very useful remedy for many complaints of the eye.

(3) It destroys all विषदोष.

(4) It is useful in cough, phthisis and asthma, given twice a day with honey.

(5) It is very useful in low fevers, giving rise to burning sensation in the eyes, palms and soles.

(6) *Vasanta kusumakara rasa* (वसन्त कुसुमाकर रस)—Take of prepared gold, camphor, each two parts, of prepared tin, lead and iron, three parts each, prepared talc, pearls and coral, four parts each. Rub these ingredients together in a mortar and soak the powder seven times successively in each of the following fluids, namely, milk, sugar cane juice, juice of *Adhatoda Vasica*, decoction of lac and of *Pavonia Odoraia* (*ba'la'*), juice of the flowers and root-stock of the plantain tree, of the root-stock of *Nelumbium speciosum* (*padma*) and of the flowers of *Aganosma Caryophyllata* (*ma'latipuspa*). Lastly soak in an infusion of musk prepared by macerating one part of musk in eight parts of warm water for twelve hours. Divide this mass into four-grain pills. They are given with sugar, honey and *ghee* in urinary diseases, impotence, gleet, diabetes, consumption and general debility.

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CORALS.

= प्रवाल =

Vern. Sans.—Pravala ; Vidruma. **Hind.**—Parvara. **Guz.**—Parvala. **Tam.**—Pavalam. **Tel.**—Pagadamu. **Eng.**—Coral. **Beng.**—Pravala, Pal'a

Source.—Red sea ; Persian and Arabian Gulfs, Mediterranean sea and Atlantic Ocean,

Correction.—It is kept soaked in lime-juice for some time.

Preparation of प्रवाल भस्म—The corrected corals are put into crucibles which are made red hot on fire. When they become white, they are reduced into powder.

Physiological Action.—Antacid, astringent, nervine tonic, laxative and diuretic ; also said to be emetic, antiphlegmonous and antibilious. It contains organic matter 8 p.c., carbonate of lime 83 p.c., magnesium carbonate 3.5 p.c. and oxide of iron. The red colour is due to its containing iron.

Dose.—5 to 15 grains.

Therapeutics.—(1) It is used in urinary diseases, consumption etc, and increases the strength, nutrition and energy of weak persons.

(2) Boils and itches are cured if it is taken in ripe plantain.

(3) It is specially useful in phthisis cases in 2 grain doses.

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CARBONATE OF SODA.

=सर्जिकाक्षार=

Vern. Sans.—Sarjika'ksha'ra. **Beng.**—Sa'ji. **Eng.**—Dhobi's earth. **Tel.**—Savite-mannuppu. **Tam.**—Sanchhikaram. **Guz.**—Sajjikhar.

Source.—It is produced from several species of salt worts growing in the brackish soil in the Punjab and North-west Provinces ; the dried plants are burnt with a special process, to obtain the carbonate in pots and the residue is left as crude dirty Potash. It occurs in porous granular masses of greyish white colour with a strong alkaline taste.

Chemical Composition.—It consists of Carbonate of Soda with certain impurities, such as organic matter, Sulphate of Soda, Potash etc.

Physiological Action.—Stomachic, antacid, carminative, diuretic, gastric sedative.

Dose.—6 to 20 grains.

Therapeutics.—(1) *Externally.*—A paste made of equal parts of *yavaksha'ra* and *sarjika'ksha'ra* with water is applied to abscesses, for the purpose of opening them.

Internally.—It is useful in indigestion, acid dyspepsia, colic and tympanitis.

(2) *Sarjika'dya churna* (सर्जिकाद्य चूर्ण)—Take of *sarjika'ksha'ra* and *yavaksha'ra*, rock, *sanchal*, *vit*, *sa'mber* and *karkach* salts in equal parts, powder, soak in lemon juice or the juice of pomegranate fruits and dry in the Sun. Dose about twenty grains. This medicine is said to promote the appetite, to remove local swellings or tumours in the abdomen and to cure dyspepsia with severe pain after meals.

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CARBONATE OF POTASH.

==यवक्षार==

Vern. Sans.—Yavaksha'ra. **Eng.**—salt of Tartar. **Guz.**—Kharo. **Tam.**—Mara-uppu. **Tel.**—Mannu-uppu.

Source.—It is prepared by reducing to ashes the green spikes of the barley (*Hordeum hexastichum*), dissolving the ashes in water, straining the solution through thick cloth and evaporating it over the fire. It is a clear amorphous powder with a saline and partly acid taste.

Chemical Composition.—Yavakshara is carbonate of potash with some impurities.

Physiological Action.—Stomachic, laxative, diuretic, antacid, resolvent and alterative.

Dose.—5 to 10 grains.

Therapeutics.—(1) It is used in urinary diseases. dyspepsia, enlarged spleen and other enlargements of the abdominal viscera.

(2) A decoction of chebulic myrobalan and *rohitaṭa* bark is given with the addition of carbonate of potash and long pepper in enlarged spleen and liver, and in tumours in the abdomen called *gulma*.

(3) In strangury or painful micturition, carbonate of potash with sugar is considered a very efficacious remedy.

(4) It is also used in piles, *shula* (colic), cardialgia, dropsy, small-pox, and urticaria.

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NITRATE OF POTASH.

=सोरा=

Vern. *Hind.* *Beng.*—Sora. *Eng.*—Saltpetre. *Tel.*—Patlu-uppoo. *Tam.*—Sindur lavan.

Source.—The crude nitre is chiefly found in the surface soil of upper India ; it is purified by crystallisation.

Physiological Action.—Diuretic and diaphoretic.

Dose.—5 to 20 grains.

Therapeutics.—(1) A concentrated solution of nitrate is frequently applied to the abdomen of infants as well as of adults to relieve tympanitis and over the lower abdomen to produce diuresis.

(2) It is a capital remedy for removing the headache due to a debauch. 20 grs. of nitrate with 30 grs. of potassium bicarbonate in a tumbler of soda water is the best method of administration in such cases.

(3) In inflammatory conditions of the trachea and bronchi, it is still considered a reliable antiphlogistic and expectorant.

(4) A remarkable preparation (श्वेतपर्पटी)—is prepared from it, which is extensively used by the kavirajes and is a good diuretic.

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DRUGS FROM THE ANIMAL KINGDOM LEECHES.

= जलौका =

Vern. *Sans.*—Jalauka. *Eng.*—Leech. *Beng.*, *Hind.*—Jonk. *Tam.*—Attei. *Tel.*—Attralu.

Source—In India there are many distinct species, which are gathered from marshes and tanks.. The good leeches are found in clear and deep pools of water which contain water lilies and are surrounded with sweet smelling plants. The middle sized leeches are the best.

Physiological Action.—Each leech draws from 1 to 2 drs. of blood. The effect of leeching is both local and general depletion, which is analogous to counter-irritation. As an antiphlogistic, it is used for the local abstraction of blood and its action is slow.

Therapeutics.—(1) Leeches are usually applied to relieve congestion or pain of deepseated structures or organs as in Pleurisy, Pneumonia, Pericarditis, Hepatitis, Ovarits, Cellulitis, Tonsillitis, Otitis, Meningitis etc.

(2) They should never be applied to regions supplied with much loose connective tissue, as extensive ecchymosis may result.

(3) They should not be applied directly to an inflamed surface, as the bite is irritating, but rather to the periphery.

(4) They should not be placed on conspicuous portions of the body, or directly over a superficial artery, vein or nerve.

(5) They are generally applied to the temples or the back of the neck in cerebral congestion or inflammation, in front of the tragus or to the mastoid in acute otitis media and acute mastoiditis, to the coccyx in congested or inflamed haemorrhoids and to the perineum when the labia, scrotum, or penis are inflamed.

Mode of Application and Caution.—(1) A fresh healthy leech should be used, for if it has once been applied to a septic surface it may convey infection.

(2) The leech must not be touched by the fingers. If it refuse to bite, a little cream, milk or sugar may be applied to the spot.

(3) It should not be pulled off but allowed to fall off of its own accord. If it does not, it can easily be dislodged by sprinkling a little salt over it.

(4) It must be remembered that the smoke of tobacco or any other strong smell in a room often prevents the leech from biting.

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HART'S HORN.

= मृगशृङ्ग =

Vern. Sans.—Mrigasringa. **Latin**,—Ceivus Dama.

Preparation.—The powder is prepared by burning hart's horn in closed vessels and then reducing the ashes to a fine powder.

Therapeutics.—

Externally—(1) It is rubbed into a paste with water and applied over the chest in cases of pleurisy, pneumonia, etc. ; opium is added to it to enhance its action.

Internally.—(1) It is given in painful affections of the joints, sciatica, lumbago, cardialgia, pleurodynia, and other affections of the heart with clarified butter.

(2) Its chief use is in cough, asthma, loss of appetite and phosphaturia especially of children.

Physiological Action.—The powder is nutritive & demulcent.

Dose—15 to 25 grains.

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LAC

= लक्ष्मी =

Vern. Sans;—L'aksha. *Hind*—La'kh. *Beng*—Gala, *Eng*—Lac. *Mal*—Laksha. *Guz*—Lakha.

Source :—*Coccus Lacca* is the name of a lac-insect. The *Butea frondosa* is called La'ksha' taru or lac plant. In cold weather the branches of the lac plant also of plum tree often swarm with these insects and seem covered with a red dust. *Shell-lac* is the transformed preparation of these red dust.

Physiological Action.—Lac is a resin, usually of a reddish or dark brown colour with a disagreeable smell and easily breakable with a crackling sound. According to Bhabaprokash, it is cold, tonic, anthelmintic and febrifuge. It is also used as a colouring matter,

Dose :—10 to 40 grains.

Therapeutics :—(1) Shell-lac is used in the preparation of sealing-wax, varnish for furnitures.

(2) Shell-lac finely powdered, half a tola mixed with honey & prepared in the form of an electuary is given in haematemesis.

(3) *Lakshadi taila* (लक्षादि तैल).—Take of shell-lac two seers, water sixteen seers, boil till reduced to four seers and strain. To this decoction of shell-lac add four seers of prepared sesamum oil, sixteen seers of whey, and two tola's, each of the following substances, namely, *Withania somnifera* (*aswagandha'*), turmeric, *devada'ru* wood, root of *Sansevieria Zeylanica* (*murva'*), *Pandanus odoratissimus* (*Ketaki*), *Vanda Roxburghii* (*ra sna*), dill seeds and liquorice root in the form of a paste and prepare an oil in the usual way; lastly add four tolas of camphor. This oil is much used for inunction in chronic fever and consumption.

MUSK.

=मृगनाभि=

Vern. Sans.—Mrigana'bhi, Kasturi. **Beng., Hind.**—Kasturi. **Eng.**—Musk.

Source.—Musk producing animal, *Musk moschiferus* is found generally in the Himalayas, China, Siberia, Kamrup, Nepal, and Kashmir. Musk is the inspissated and dried secretion from the preputial follicles of these animals.

Physiological Action.—Stimulant, aphrodisiac. It acts principally on the heart and the nervous system. It improves the circulation and raises arterial tension. It is also reputed to stimulate the respiratory centre. Its effects are more manifest in excitable and nervous persons than in others.

Dose :— $\frac{1}{2}$ to 2 grains.

Therapeutics.—*Externally*—(1) musk is largely used in perfumery.

Internally.—(1) As an aphrodisiac it is given in combination with other aphrodisiacs in seminal weakness and impotence.

(2) In palpitation of the heart it is said to be useful.

(3) In low fevers with prostration, two grains of musk with two grains of *Makradhawaja* are given every three hours with the addition of honey.

(4) It is used in syphilis and gonorrhoea. A very little quantity (like सरिषा) is to be taken for two or three days at one time.

(5) Lying-in women generally take betel leaves with musk. It destroys the weakness of the body and stimulates the general health.

(6) It is used in typhus, typhoid, whooping cough, laryngismus stridulus, epilepsy and chorea etc.

(7) *Svalpa Kasturi Bhairava* (स्वल्प कस्तुरी भैरव).—Take of cinnabar, aconite, borax, nutmeg, mace, long pepper, black pepper and musk, equal parts and make into four-grain pills. These are given in remittent fever of low type.

BILE

=पित्त=

Vern. sans.—Pitta.

Source.—Fresh bile from fish, goat, wild boar and peacock is used medicinally.

Physiological Action—Laxative, anti-septic. Bile is alkaline ; it therefore assists the pancreatic juice in neutralising the chyme that leaves the stomach. It assists the absorption of fats. It is also a solvent of fatty acids. Bile helps the emulsification of fats, and is a cholagogue purgative.

(1) Its principal action is as a coadjutor to the pancreatic juice (especially in the digestion of fat).

(2) It is said to be a natural antiseptic, lessening the putrefactive processes in the intestine.

(3) It stimulates peristalsis in the large intestine.

Dose :—5 to 15 grains.

Therapeutics.—(1) The bile of an ox, wild boar, goat, peacock and *rohitaṅga* fish is used in medicine, either singly or in combination under the designation of *pancha pilla* or the five biles.

(2) Bile is chiefly used in soaking powders intended for being made into pill-masses.

(3) It is used in those cases of dyspepsia and constipation in which the natural secretion of bile is deficient..

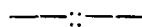
(4) *Udaṅga manjari rasa* (उदक मञ्जरी रस)—Take of mercury, sulphur, calcined borax, and black pepper, each one part sugar and the bile of *rohitaṅga* fish, four parts each ; rub them together for three days and make into six-grain pills. These are given with ginger juice in recent bilious remittent fever. If there is much heat of head, cold water should be applied to it.

(5) *Gorochana*, (गोरचना) or the concretions found in the gall-bladder of the ox, are useful in abortion and diseases, supposed to be caused by evil spirits ; It is sometimes given to infants in small doses as a laxative.

(6) Bile is the main constituent of preparation of सूचिकाभरण रस, which is given in remittent fever with cerebral complications.

APPENDIX
TO THE
PHARMACOPŒIA INDICA

Showing
Investigations done in the Chemical
&
Physiological Research Laboratories
of
Dr. Bose's Laboratory Ltd.,
with suggestions for
further work.



Foreword

In this Appendix to the Pharmacopoeia Indica we briefly narrate the methods of **drug analysis** followed by us to find out the chemical composition of a drug. We do not attempt to find out the chemical constitution fully as that is a complicated and special process generally done by combustion analysis and other complicated methods, which are too technical from a medical and therapeutic point of view ; we have therefore restricted ourselves to the ordinary chemical composition and their percentage.

We have also given a short narrative of the various pharmacological examinations done in our Pharmacological Laboratory. By going through it the reader will refresh his memory regarding the physiological data underlying these examinations and then there will be no need to consult a *Text-Book* on the subject.

While describing the results of our researches, we have indicated further lines of work so that our profession may avail itself of our ideas, and subsequently devote to clinical as well as research work on the subject.

Methods of Drug Analysis



Any part of plant body (whether leaves, flowers, seeds, bark, root or stem) may contain one or more useful active ingredients. Such drugs may also consist of woody, fibrous tissues (mainly cellulose) and matters extractable in water, alcohol, ether or chloroform. The latter may consist of gums, resins, mineral salts, fatty or essential oils, carbohydrates (such as starch and sugars) and complex groups such as glucosides and alkaloids.

Whenever an exhaustive analysis of a drug is to be carried out, it is essential that it should be subjected to the action of hot solvents individually, or of suitable mixtures of them. But as in some cases such treatment may produce hydrolysis of any complex radicals present, the treatment with hot solvents must be replaced by cold maceration.

The dried drugs are disintegrated and powdered and meshed in No. 80 sieve. Generally for the determination of total extractive matter, 10 grams of the finely powdered drug are taken. The extraction may be effected either with alcohol (90 per cent. Rectified spirit), ether or water in a Soxhlet apparatus or by maceration in a stoppered cylinder, till the extraction is complete. The extract is then filtered and distilled till it is deprived of the greater part of the solvent present. It is then transferred to a tared vessel, evaporated and the residue weighed. It is then examined qualitatively according to scheme to be detailed below.

When a mixture of water and alcohol (3:2) is found to be a suitable extracting fluid, 200 grams of the drug after maceration with a small quantity of the solvent, are packed in a small percolator, and percolated with more liquid till the extraction is complete. The filtered extract is treated as before and then examined.

Qualitative tests.

Test for nitrogen-containing bodies.—

(1) A portion of the residue is fused with Sodium—the fused mass is dissolved in water, filtered, a few c.cs of Fe_2SO_4 solution are added, boiled, a drop of Fe_2Cl_6 added and then acidified with HCl . A prussian blue or merely a greenish blue coloration would indicate the presence of nitrogenous matter, an alkaloid for instance, in the extract.

Test for alkaloid. —

(2) A portion of the residue is boiled with water acidulated with a few drops of H_2SO_4 . The liquid is transferred to a small separator, and shaken with chloroform. The chloroform is drawn off and the aqueous liquid is made alkaline with ammonia and shaken with ether-chloroform mixture (3:1). The ether-chloroform layer is filtered into a watch glass, evaporated and taken up in dil. sulphuric acid, and tested with Meyer's Reagent—a white or yellowish white precipitate indicates the presence of an alkaloid.

Test for alkaloid or glucoside.—

(3) A small portion is treated with H_2SO_4 conc ; any color change is noted ; $\text{K}_2\text{Cr}_2\text{O}_7$ powder is then sprinkled. Any characteristic coloration indicates the presence of an alkaloid or of a glucoside.

Test for glucoside.—

(4) A portion is dissolved in water and alcohol, and boiled with Fehling's solution. Any reduction is noted. A fresh portion is dissolved in water and alcohol, and boiled with a few drops of Sulphuric Acid dil. neutralised with NaOH soln, and afterwards boiled with Fehling's soln. A copious reduction after hydrolysis and slight or no reduction before shows the presence of a glucoside.

Quantitative estimation.

The next step in the operation is the isolation and quantitative estimation of the complex groups, alkaloids or glucosides, if found. Since they are present in very minute quantities a greater amount of the drugs should be treated than that taken for analysis. The method followed is briefly outlined below :—

For alkaloids.—Greater part of the alcohol from the liquid extract prepared is removed by distillation. The residue is transferred to a separator and slightly acidulated and then shaken with chloroform. The chloroform layer is drawn off. This removes resins, coloring matters etc. The aqueous liquid is made alkaline with ammonium hydrate, the alkaloid is extracted by repeated shaking out with Ether-chloroform mixture. The mixed ethereal liquid is washed with water and filtered into a tared vessel and evaporated. The crude alkaloidal residue may be purified by crystallisation from a suitable solvent.

For Glucosides.—The isolation of a glucoside requires special treatment in each case, as any enzyme coexistent in the plant body must first of all be destroyed as the latter may produce hydrolysis of the complex groups. The glucoside present in the crude drug may be extracted when boiled or better still, macerated with Rect. Spirit (90 per cent). Sometimes a mixture of alcohol and water (40 per cent.) is very suitable for the isolation of the glucosides without hydrolysis. The glucosides usually come down when the drug is boiled with water alone ; but there may be more or less reduction of the complex group in the process.

The liquid extract of the drug is clarified with Lead Acetate soln. and then filtered. H_2S gas is passed into the filtrate and the liquid again filtered. The filtrate is now concentrated.

Alternatively, the extract is treated with Tannic Acid and the precipitate obtained, is transferred to a basin and mixed with sufficient Lead Carbonate and heated cautiously. The mass is now treated with absolute alcohol and filtered. The filtrate is evaporated.

Pharmacological Examination.



The methods of Pharmacological Examination, the findings therefrom and their interpretations are still in an experimental stage—various workers, using different methods and interpreting in a different way. As yet no fixed method has been devised.

The animals used are of different species ; some use the cold blooded ones as the frogs and fishes, others use the warm-blooded ones as the rabbits, guineapigs, cats and dogs and many use both kinds of animals and make deductions which do not prove to be true in the case of man.

As the warm-blooded animals have a highly developed nervous system, we used only their isolated organs (as uterus, heart, muscle, nerve etc), by keeping them alive in Ringer's solution, with thermo-regulation and oxygen application.

For general work, we use the frogs or fishes (of the pikes group) for cardiographic tracings. Recording the findings, has been done by taking tracings on smoked paper.

We must admit, however, that all pharmacological findings have to be checked very carefully with an un-biassed mind by using the drugs on man, in health and disease. Without this modification, true human pharmacology cannot be ascertained and all our future therapeutics must rest on this kind of real pharmacology. Besides, in disease, drugs have a specific action in many cases which no amount of pharmacological or bacteriological experiments can determine in the present state of our knowledge.

Selection of tissues (animal) and Recording apparatus.

Almost all the modern methods depend upon recording the change of phases produced in the tissues by the application of

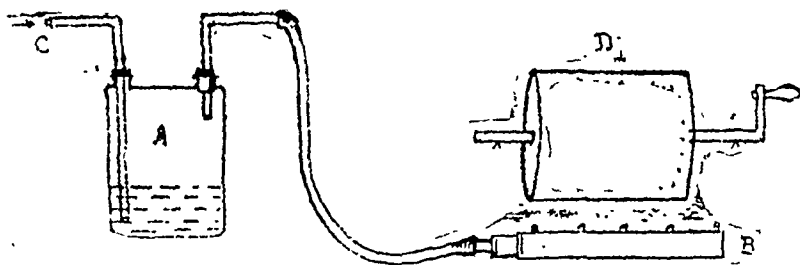
specific drugs. Tissues, selected for experiment, are generally of muscular nature and the experimental results are verified by the following factors.

- (1) Rythmicity.
- (2) Tonicity.
- (3) Amplitude of contraction.

Besides these, there are other factors which are applied to different individual tissues ; thus in the case of heart, we find that under normal circumstances, heart is beating regularly with certain force and frequency with a definite interval of pause after each beat. By the application of a drug, these factors, namely force and frequency and duration, may be altered. The nature of the change will point to the true nature of the action of the drug ; —does it act like a stimulant or a depressent ?

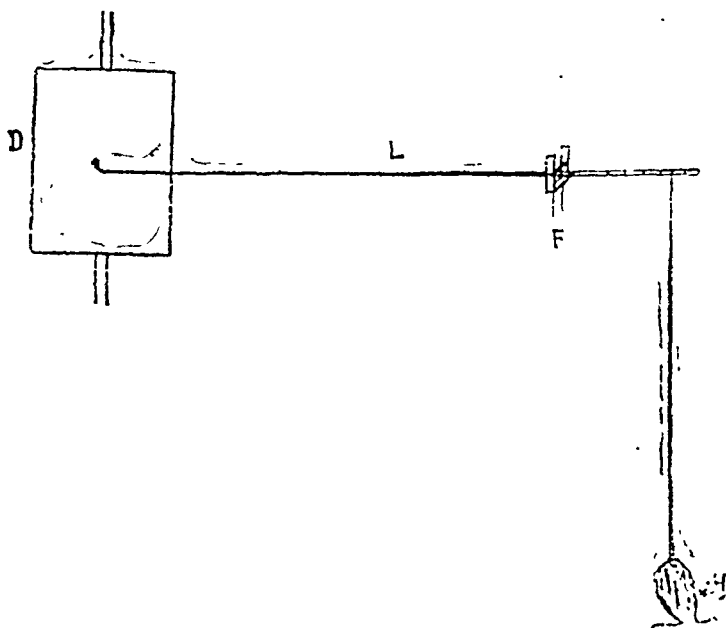
Some of the devices for recording the movements produced by different organs are described below :—

Mymograph—This a simple bit of apparatus, which automatically rotates a drum on its own axis. This rotation is carried out by means of a clock-work device. The rotation of the drum may be made fast or slow by regulating the clock-work by an adjusting screw. The paper used for recording is a glossy white paper tightly glued to the drum by a particular method, so that the paper can be removed easily, when required. The paper is smoked in the gas flame, by the following device :—



Coal gas is allowed to pass through a Woulfes bottle, containing Benzene, so that the outlet gas carries a large quantity of benzene vapour along with it, thereby helping smooth and uniform smoking on the paper.

The writing lever—To record the movement of the organs, they are generally suspended in the following way to a writing lever (as shown in the diagram.) One end of the lever is attached to the apex of the organ by a fine thread, having a bent

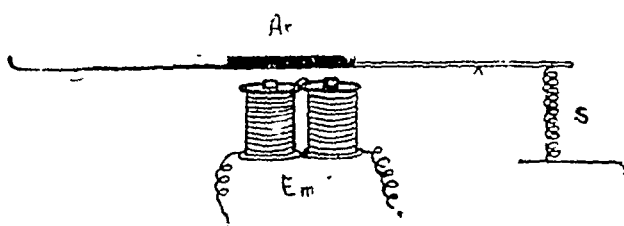


hook which pierces that organ. The other end of the lever carries a piece of small stiff paper, cut in a sharp angle, so that when allowed to scratch on smoked paper, it produces a fine white line.

The animal-table and the writing-lever, are arranged on a stout three-legged stand having a rack and pinion for regulating the height of the table; they are placed near the drum in such a way that slight tilting of a bent lever at the base of the stand, may bring the writing point in contact with the drum.

Now, if the drum is allowed to rotate, the contraction and relaxation of the tissue produce up and down movement of the lever which marks out, on the smoked paper a curve, recording the finer contraction.

Time marker—This is a contrivance for recording the time of the drum-movement on the smoked paper. It is a small electro-magnet, having a little armature, which is fixed to a lever; so that as soon as the current passes through the magnetic coils, it draws the armature, and moves the lever and as the current is off, it leaves the armature and owing to spring action, the armature goes away. Thus, if the current is regulated on clock-work principle, the to and fro motion can be recorded on the drum.



The time of make and break of the current, is regulated by a clock-work device.

There is also an arrangement for regulating the time of contact, as required. Thus records of 1," 2," 3," 4," 5" intervals can be regulated as desired.

After complete arrangement of the apparatus, the normal curves are taken and then the changes produced by the application of the drug, can be also observed.

In this way, we find the action of various drugs on different animals whether cold-blooded or warm-blooded.

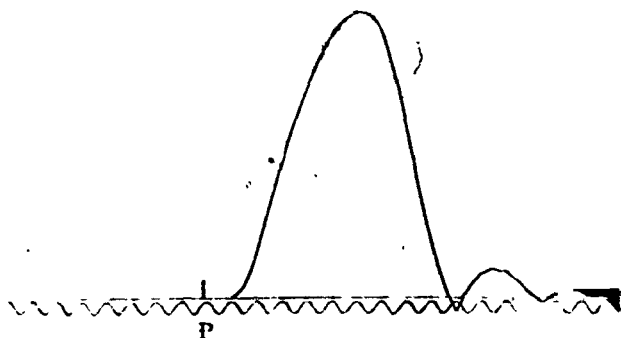
Study of curve records produced by different tissues.

Nerve-muscle preparation—Generally, frog's grastocnemeus muscles are selected for simple muscle contraction curves.

After pithing* the frog (in the manner noted in the foot-note), the gastrocneus muscle is separated and the nerve supplying the muscle is dissected out. The n-m preparation, is kept in normal saline. The muscle is attached to the writing lever of a Myograph by suspension method. The nerve is placed on two electrodes, which are connected to the secondary of an induction coil, so that as soon as a shock was applied, the nerve conducted the impulse and contracted the muscle. The contraction followed by relaxation is recorded on the moving drum. If the duration of induction shock, is prolonged, instead of making it momentary, the nature of curve, is changed.

The following are examples —

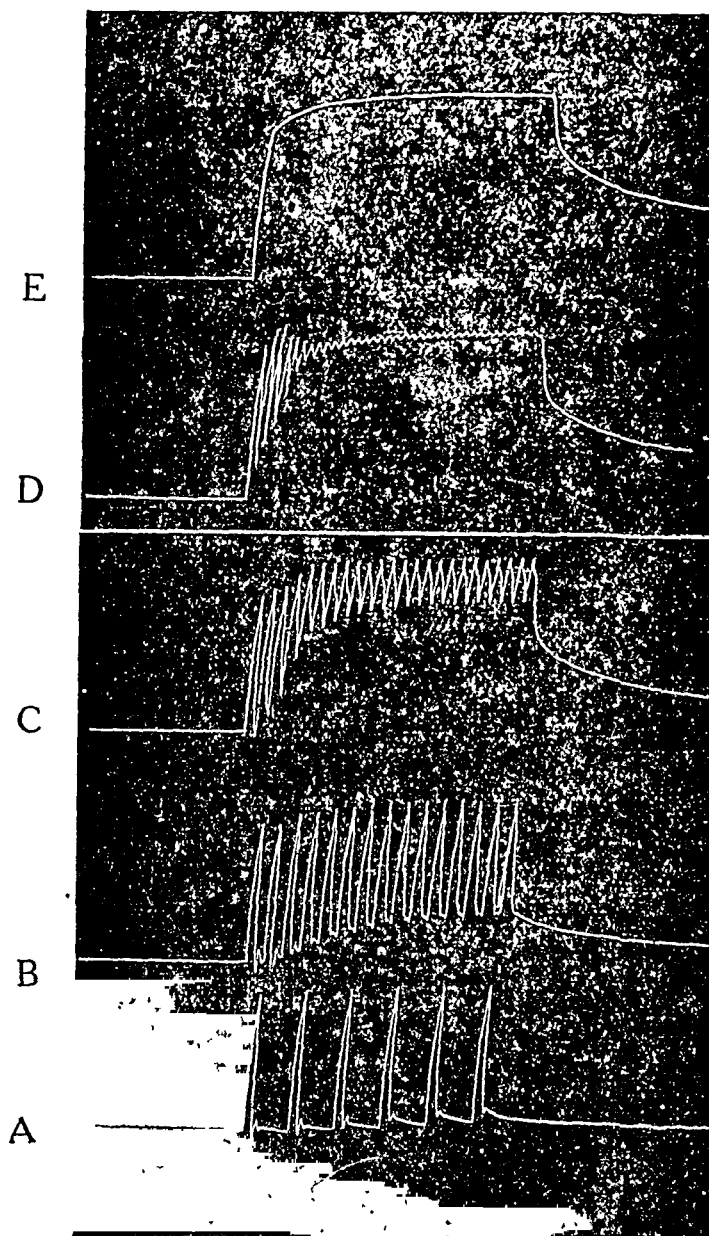
MOMENTARY FEEBLE SHOCK



*The frogs are stunned by slight blow on the head. Then a blunt needle is allowed to pass through a foramen at the junction of the spinal column and the skull, to the brain. The brain is totally destroyed by rotatory movement of the needle. Then the needle is allowed to pass through the spinal column, destroying the spinal cord. Thus the frog becomes totally unconscious and is ready for any operation.

SHORT PERIOD OF FEEBLE SHOCK AND LONG
PERIOD OF STRONG SHOCK

(Producing clonic and tetanic contractions.)



Experiment made upon the gastrocnemius muscle of a frog to show that by increasing the rate of stimulation the contractions, at first separate (A), fuse more and more through a series of incomplete tetany (B, C, D) into a complete tetanus (E) in which there is no indication, so far as the record goes, of a separate effect for each stimulus.

If a muscle is repeatedly allowed to undergo shock, the muscles get fatigued.

Heart—As regards preparation of heart for recording, the fish or frog's heart is used in our laboratory. The animal is pithed in proper manner without much injury to the brain. The animal is then placed on the Frog-table and clamped and the middle portion of the chest opened by means of a pair of forceps and scissors ; the heart is exposed and the pericardium is carefully snipped off, for attaching the hook of the writing lever to its apex.

As soon as the heart is connected to the writing lever, it goes on dancing, with each beat of the heart, about 70 or 80 per minute, in the case of frogs and 60 to 70 per minute, in the case of fishes, producing all the peculiarities of the normal heart curve—as shown in the following diagram viz., auricular systole, auricular diastole, ventricular systole, ventricular diastole, diastolic pause,



All the above conditions are vividly marked out in the curve.

When by the action of a certain drug, the heart stops in systole, the graph will show the straight line on the top of the curve.

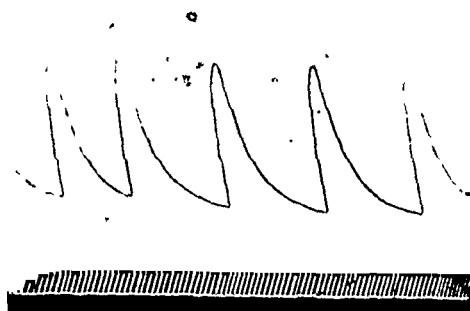
When the frequency is increased then the pause may disappear and the heart goes on beating as quick as possible. Beats may be frequent but amplitude may be small and so on,

These show—what portion of the heart is affected and how a drug causes the change.

Stomach and Intestines—The stomach and Intestines are mainly composed of unstriated, involuntary muscle fibers (autonomic) and they go on contracting and relaxing rhythmically if kept in proper condition.

The stomach of a frog is dissected out after pithing it and keeping it in Ringer Tyrode solution. It is attached to the writing lever by suspension method. As soon as the peristaltic wave starts, the wave of contraction-and-relaxation produces up and down movement of the lever. As soon as the contact of the writing point with the smoked drum is made, continuous peristaltogram is produced; the peristalsis will depend upon the external reagents or mechanical or electrical disturbances produced in the organs from outside.

NORMAL PERISTALTOGRAM OF FROG'S STOMACH.



Time 4" sec.

Uterus—Guinea Pig's uterus is generally selected for our work. After slight stunning, an operation is made to disconnect brain and spinal cord. The animal becomes quite senseless.

The abdomen is opened and uterus exposed. After careful separation of the attachments, with the body of the uterus, the two horns are taken out and kept in Ringer's Solution. Each horn is then dissected out separately and connected to two levers (by suspension method) and arranged side by side, one for control and the other for recording the action of drugs previously arranged,

In this way effect of drugs on animal tissue is verified.

ABIES WEBBIANA.

(TALIS LEAVES)

Samples were examined to find out, whether any deterioration takes place on keeping.

Fresh leaves—35.8 per cent alcohol extractive; 11.4 per cent ether extractive.

Old leaves—26.2 per cent alcohol extractive; 9.8 per cent ether extractive.

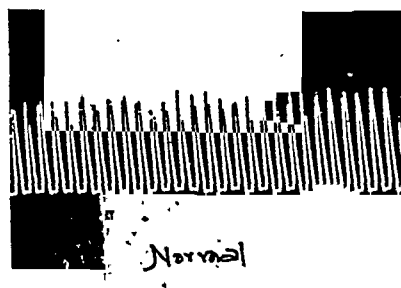
So, for therapeutic purpose only the fresh leaves (having greenish colour) should be used; the old leaves become brown on keeping.

Dymock—calls *Taxus Baccata* as *Talispatra*; but *Abies Webbiana* is used as *Talispatra* by the Kavirajs of Bengal (U. C. Dutta.)

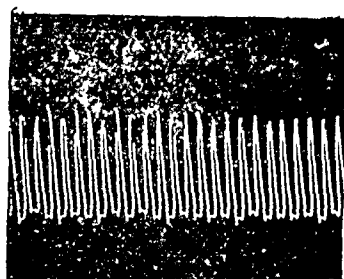
Dymock—describes an alkaloidal principle present in yew (*Taxus Baccata*) as “Taxine”—but we have failed to detect any alkaloid in *talispatra* (*Abies Webbiana*).

Pharmacological experiments.—“Taxine” is poisonous.

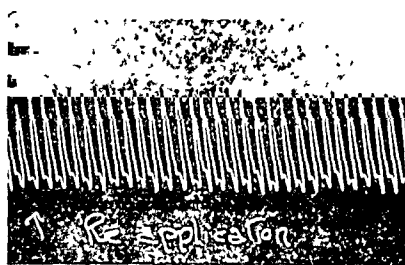
We made experiments with .5 gram of the drug in 20 c.c. warm saline—This extract was applied to the frog’s heart with the following results :—



Normal tracing of frog's heart.



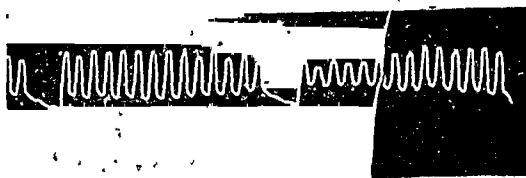
1st. application of the extract on Heart
Heart in tonic condition ; auricles prominent.



2nd application



after continued applications blocking of the heart was noticed



After 1 trial dose there is diminution of amplitude and force.

Our conclusion :—it is stimulant in small doses, large doses have a poisonous action.

ABROMA AUGUSTA.

(OLAT KAMBAL)

Analysis of Abroma Augusta.—10 grams of the dried and powdered drug (root bark) was exhausted with Rectified spirit. The filtered liquid was evaporated on water bath in a tared vessel. The total extractive matter was found to be 5.2 per cent. of crude drug.

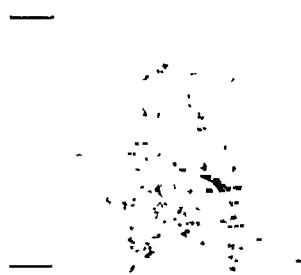
2 grams of the finely powdered dried root-bark was treated with ether in a stoppered cylinder and the contents shaken for about 2 hours and left overnight. The filtered extract was evaporated and weighed, The Ether extractive matter was found to be 1.5 per cent only.

Both these extracts, were examined qualitatively, neither any alkaloid nor glucoside was detected. The alcoholic extract mainly consisted of tarry resins.

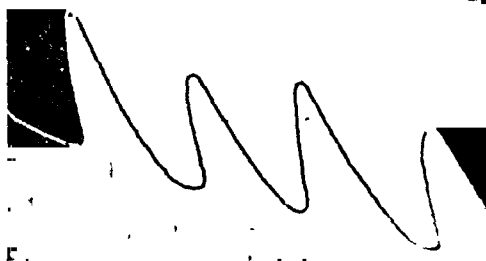
An extract of the drug obtained by boiling with water alone was also prepared. This does not respond to any test for glucoside or alkaloid.

Pharmacological experiments.—2 grms. of the dried root bark was digested in 20 c. c. warm saline. This extract was applied to Guinea-Pig's uterus.

Effect of Abroma Augusta on the Guinea-Pig's uterus.



Normal Contraction.



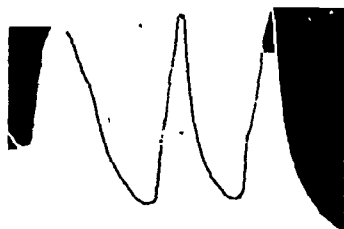
After application of the ^Tdrug,
contractions became vigorous.



Complete appearance of the contraction
and tonic condition.



Irregularity after washing with saline.



Reappearance of contraction after re-application
of the drug.



Total relaxation of tissue after stoppage of oxygen supply—

Our conclusion :—Abroma Augusta root has got a tonic contractile action on the uterus and its use is, therefore, indicated before the menses, to help the uterine contractions to bring about a proper flow of menstrual blood.

ABRUS PRECATORIUS.

Chemical Composition and toxic action.—The “Pharmacographia Indica.” (by Dymock, Warden and Hooper)—summarises as follows :—

1. The toxic action of the Jequirity (Abrus Precatorius) resides in two proteins, a globulin and an albumose (these together are known as *arbin*).

2. Both these proteins produce nearly the same effect, namely local oedema and ecchymosis at the seat of inoculation, with ecchymosis in the serous membranes, and gastro-enteritis, the blood in many cases remaining fluid. The general symptoms are gradual sleepiness, ending in coma, with rapid onset of rigor mortis.

3. That both portions have a remarkable lowering effect on the body temperature ; the globulin at the same time, producing rapidity of breathing, while the albumose does not have this effect to the same degree.

Relation of Abrus poison to snake venom.—The researches of Weir-Mitchell and Reichert, have shown that snake-venom, is of an albuminous nature and contains two varieties of proteins, a globulin and a peptone. All kinds of venom contain these bodies although in varying proportions ; the globulin being greater in proportion to the peptone in the viperine snakes

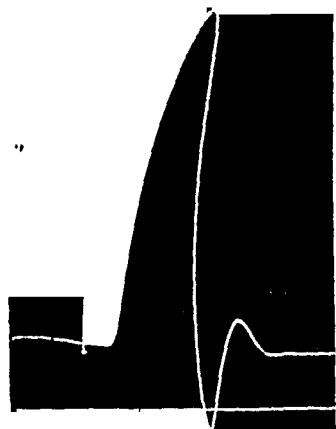
(such as rattle snakes) and the peptone being in greater proportions in the colubrine snakes (such as the cobra). Both the globulin and peptone of the venom are poisonous, producing practically the same general symptoms, but with the exception (and a noticeable one it is) that the general local ecchymosis and inflammation of snake bite is due to the globulin present in the venom and not to the peptone.

The relation of abrus poison to snake venom is now apparent although the snake venom is little affected by heat.

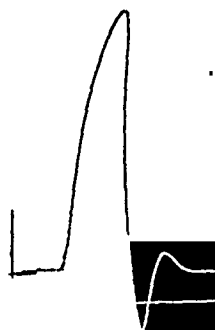
Ayurvedic preparation (सुचिकाभरण रस) contains snake venom. Why not substitute Abrin for snake venom. This should be a subject of research by the leading Kavirajs.

Physiological Action.—The action of *Abrus Precatorius*—on nerve-endings.—is shown below :—

On Nerve-ending. (Gastrocnemius muscle)



NORMAL curve after electric stimulation.



EFFECT OF DRUG. (2 grms. smashed seeds in 20 c. c. cold normal saline.)

Producing (partial) Block showing delay of transmission. See latent period.

Action of Abrus Precatorius on the frog's heart-beat.



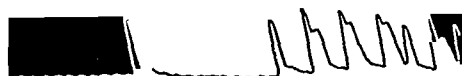
NORMAL.

SLIGHT STIMULATION ON SMALL DOSE.
(2 grms. in 20 c. c. of cold normal saline.)



LARGER DOSE.

Produces depressing action.



CONTINUAL APPLICATION OF THE DRUG.

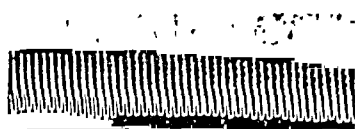
Produces heart block, irregularity and complete stoppage in systole. Showing poisonous property of the drug.

The *jequirity treatment* of Granular Ophthalmia is not popular in this country although we meet with cases of Granular Ophthalmia and its complications, so frequently. The poor sufferers drag on a miserable existence for a long number of years, till they get blind. We now appeal to the Indian staff of the ophthalmic hospitals, to try the *jequirity treatment* cautiously, by keeping the patients under observation, as inmates of the hospital and publish their report, so that the general practitioner and the suffering humanity might derive benefit from their researches.

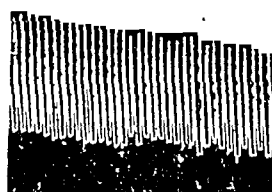
ACHYRANTHES ASPERA.*Analysis of Apang Kshar.—as done in our laboratory.*

Potassium Bicarbonate—	...	...	37. 48
Potassium Carbonate—	...	...	14. 10
Organic matter—	...	...	21. 20
Moisture—	...	...	12. 45
Iron and Aluminum Oxide—	...	...	8. 20
Impurities as Sand etc—	...	...	1. 80
			<hr/> 100

Physiological Action.—Effect of “Apang” (Achyranthes Aspera) on heart. 2 grms. of the drug boiled in 20 c. c. normal saline.



NORMAL.



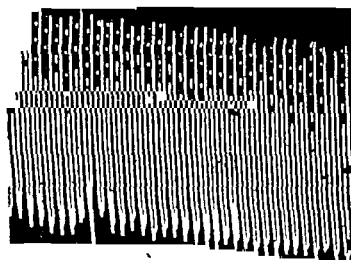
STIMULANT after first application.



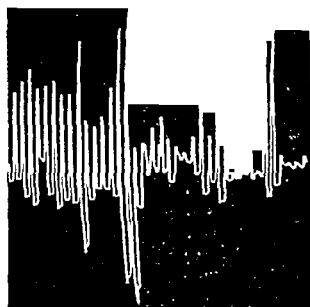
HEART BLOCK.

After repeated doses, produces Heart-block and Irregularity.
Ultimately it is depressant to the heart,

Another experiment.



NORMAL.



IRREGULARITY.

After application of concentrated solution.

ACONITUM FEROX & NAPELLUS.

Mitigation or शोधनक्रिया of Ayurved. The mitigation is done by soaking slices of aconite root in cow's urine and exposing the dish containing the slices to the Sun ; this is continued for 3 or more days, till the tough horny aconite becomes so soft as can be easily pierced by a pin. The cow's urine is daily changed and fresh urine added.

In this process of soaking and exposure to the Sun, it loses a portion of the active principle.

We examined specimen both of crude and mitigated aconite for the alkaloidal content and it was found that the crude substance contains about 1·4 per cent. total alkaloid—whereas the aconite mitigated with cow's urine contains 1·27 per cent i. e. there is a loss of '13 per cent. of the total alkaloid.

The total alkaloids of aconite are a mixture of several alkaloids, namely.

1. Aconitine (highly poisonous).
2. Pseudo-aconitine.
3. Benzoyl-aconine which may be obtained by partial hydrolysis of aconitine. This does not produce the tingling or numbness of aconitine. On hydrolysis, benzoyl-aconine is split up into aconine and benzoic acid.

4 Aconine is a natural constituent of the root and is also obtained in the final product of hydrolysis of aconitine. It is amorphous, readily soluble in water and alcohol and the solution sweet to the taste. It is not toxic. Benzoyl-aconine is only $\frac{1}{240}$ th part as toxic as aconitine and Aconine is only $\frac{1}{9}$ th part as toxic as benzoyl-aconine and so for practical purposes, it can be regarded as non-poisonous.

Since the active principle of Aconitine Ferox is pseudo-aconitine or veratroylaconine, this drug on being treated with cow's urine and exposed to the Sun becomes hydrolysed and transformed into benzoyl-aconine and veratroylaconine, which are far less poisonous and have got pharmacological analogy to the alkaloids of the atropine group.

In the chemical analysis, conducted by us, we could only estimate the total loss of the mixed alkaloids and therefore could not definitely state the nature of the hydrolysis or transformation product, which have made the physiological action of a different nature. It requires further chemical researches in the lines done by F. Mandelin (Archiv.der Pharm.,—Feb. and March.1885) and we hope that in near future, this investigation will be taken up by some chemical worker.

STANDARDISATION OF ACONITE.

—0—

Chemical Vs. Physiological.

Tincture Aconite of B. P. 1914 is standardised so that 100 milli-litres should contain 0.04 gramme of the ether-soluble alkaloids of Aconite Root (B. P. Chemical Standardisation.)

U. S. P. (X, Edition)—standardises Aconite by biological method. Aconite in the form of tincture administered subcutaneously to guinea pigs has a minimum lethal dose not exceeding 0.00045 c.c. of tincture for each gramme of body weight of guinea pig. (Good healthy guinea pig weighing from 275 to 325 gm. should be used). The standard dose must kill within six hours at least two of every three animals so injected.

We made an investigation on the comparative value of the chemical and biological methods of standardisation of Tincture of Aconitum as manufactured in our bonded Laboratory. Aconite Ferox is generally available in Calcutta market and it was therefore used.

Tincture aconite was found chemical assay to contain .04 gramme of the ether-soluble alkaloids in 100 millilitres (B. P. Standard) and this chemically assayed preparation on biological assay as per U. S. P. (x edition) was found to be three times more toxic ; the guinea pigs dying within 15 minutes in the first instance instead of 6 hours.

Afterwards, the tincture was diluted by adding equal volume of distilled water and again tested biologically ; it was found twice as toxic ; and on further diluting the tincture with twice the volume of distilled water—the toxicity described by U. S. P. was reached. So we find that although the alkaloidal content of our tinct. aconite was as per B. P., the toxicity of the tincture was three times as much,

Alkaloids of Aconite readily undergo changes in their chemical composition under different conditions of age, moisture, temperature, storage etc. and as there are several alkaloids of different toxicity the poisonous alkaloids might become converted into less poisonous and finally into inert bodies by keeping.

Though the various alkaloids present in the root, behave similarly to solvents and precipitants, their pharmacological action and toxicity vary considerably.

Chemical methods only indicate the total alkaloids, whether active or inert ; while the percentage of the alkaloids aconitine, pseudo-aconitine, aconine is responsible for the physiological activity of the prepared drug.

It is therefore necessary that both the **chemical and biological methods of assay** should be done with every batch of Tincture aconite before it is sent out, the dates of its manufacture and assay noted on each bottle and the results of chemical determination and Physiological assay distinctly stated on the label.

POISONING BY ACONITE

PREPARATIONS

Hindu writers mention several kinds of Visha or poison, some of them being unfit for medicinal use on account of their extreme poisonous properties.

Bhabaprahasa—describes the character of these poisons—nine varieties are described. We did try to collect and identify them, but have not been successful. Indian Aconite of commerce, has been classified by Goris, who investigated the poisonous varieties and evolved a classification on the anatomical differences in the transverse section of the roots.

Stuff divided the Indian aconite into 3 types according to their being annual, perennial and biennial.

The aconites sold in the bazar are indiscriminate mixture of several varieties and the writer has come across cases of aconite poisoning, by an overdose of Ayurvedic preparation.

An over-dose of Ramban Rasa (6 pills 2 grs. each) taken by a patient, did produce cold sweats, thready and irregular pulse and collapse. The patient rallied after strychnine and atropin injection and adrenalin chloride m 10, every hour by mouth.

On inquiry about the ingredients and preparation of the particular sample of Ramban Rasa, which the patient took, I came to know that the stuff was made in his household, according to the prescription and direction of a Pundit. The ingredients, were purchased from bazar and the prescribed weight mixed and pounded in pestle and mortar, for several days, with addition of Tamarind juice and I was showed the remaining portions of the different ingredients lying in the house. On examining the drugs, I got a few pieces of aconite resembling the umbilical cord of a calf ; this variety is one of the poisonous aconites. This aconite was not purified, but added and pounded with the ingredients as obtained from the bazar. About 12 grains of the preparation, was taken by the patient and it did actually contain 2 gts. of aconite and that aconite was in crude form.

TOLERANCE OF PURIFIED ACONITE

The purified aconite was taken by Pundit Bhabataran Vidya-ratna, who personally did the purification process to try its effect and tolerance on the Human System.

The Pundit's body weight was 12 stones and he started with 2 grains daily early in the morning on empty stomach. He used to take sufficient quantity of milk and ghee, in the course of the day while taking of the drug.

No abnormal symptoms were noticed, till the dose reached upto 10 grains daily. While taking 10 grains, he experienced a sensation of heat, which used to last for 4 to 5 hours—and this gradually passed off; the urine became high coloured, eyes red, after one hour of swallowing of the drug.

Emboldened, by the administration of the drug on his own system upto 10 grains, he administered this purified aconite in a case of intractable skin disease on a Uryia patient.

The patient had obstinate skin disease, each hair-follicle being chronically inflamed (*acneiform*) and was of nearly 3 to 4 years duration.

Ten grains of purified aconite was given in one dose in the evening just before food.

The patient could not sleep in the night and experienced a feeling of tingling sensation in each hair-follicle; the sensation gradually passed off within twelve hours.

After three days, all the *acneiform* eruptions, blackened and gradually peeled off, leaving a smooth skin surface—and perfectly cured.

Aconite in this purified form, was also administered to chronic fever patient and one single dose stopped the fever. Clinical researches, on the use of purified aconite is necessary to find out how this medicine acts.

ADHATODA VASICA.

Chemical Composition—Investigation regarding the chemical composition of Bakas leaves, was taken up in our analytical department. The dried mature leaves were finely powdered and treated with alcohol and 5% of extractive was obtained. The Extract on examination was found to contain an alkaloid which Warden has styled "**Vasicine**." The drug does not contain any glucoside. The amount of extractive matter obtained by treatment with ether, is above 3% of the crude drug.

10 grams of the finely powdered substance, was macerated with ether chloroform mixture and a little ammonia. The alkaloids were finally separated by repeated shaking with dilute sulphuric acid and reprecipitating with ammonia and shaking out with chloroform the amount of alkaloid found was about 0.12 of the crude drug.

Hooper found that an odourous volatile principle probably of the nature of an essential oil and a non-volatile body of the nature of an alkaloid called 'vasicine' were present.

The report of analysis done in Tropical School of Medicine.—The alkaloid is found in the leaves to the extent of 0.25 per cent. but we have only got half the amount.

The base occurs as needle-shaped crystals and has a melting point of 182°C. It is easily soluble in alcohol, is slightly soluble in cold water but more so in hot water. A 2 p. c. solution in chloroform is optically inactive. Vasicine hydrochloride occurs in light cream-coloured crystals and has a melting point of 180°C. It is very soluble in water. Vasicine tartrate is also prepared and is a soluble salt. The molecular weight is 188, which agrees with the empirical formula of $C_{11} H_{12} N_2 O$.
(I. M. R. vol. XIII Oct. 1925)

Physiological action of the Constituents of Adhatoda Vasica.

The alkaloid vasicine and its salts have little or no effect on the free living protozoa nor have they any toxic or inhibitory effect

on the cultures and growth of streptococcus, staphylococcus or B. Tuberculosis. It is possible that the antiseptic properties of the leaves may be due to the volatile principle. Solutions of 1 to 5 per cent concentration are not irritant to the mucous membrane. The alkaloid has a bitter taste but has no marked effect on the movements of the alimentary canals. In high concentration (1 in 20,000) the peristaltic movements of the isolated gut are inhibited, probably owing to depression of the vagal endings. Intravenous injection in animals produce a slight fall of blood pressure, due partly to direct depressing effect on the cardiac muscle and partly to depression of the terminations of the vagi of the heart. There is no effect on the blood vessels.

In lungs of experimental animals the alkaloid, when given intravenously produces a slight but a persistent broncho-dilatation. The drug has a well marked expectorant action and it is probable that the essential oil plays an important part in this direction.

In acute bronchitis it affords relief specially where the sputum is thick and tenacious acting in very much the same way as ipecacuanha. In chronic bronchitis the cough is relieved, the sputum is liquified so that it is brought up more easily. The depression of the vagal terminations further relieves irritation and spasm of the bronchioles.

BOERHAAVIA DIFFUSA.

Liq. Extract of Punarnava.

Since the publication of Calcutta Tropical School Bulletin on Punarnavae, the Liq. Extract of the drug is met with containing a high percentage of alcohol (nearly Proof Spirit Strength). The average dose being 2 to 4 drams, the patient has got to consume 1 to 2 drams of pure alcohol with each dose of the Liq. Extract of Punarnava (as manufactured under the recipe of the Tropical School).

Ascites or dropsy is generally met with in persons, who have got diseased Liver and Kidney and alcohol is absolutely contra-indicated among our Indian patients in whom alcohol acts as a tissue poison.

In order to obtain the full alkaloidal contents as well as the saline content of the Punarnava plants with little or no spirit, investigations were done in the Research Analytical Dept. of Dr. Bose's Laboratory Ltd. by S. K. Sen M. Sc. and N. K. Bose M.Sc. under my supervision and guidance.

We tried various kind of solvents to extract the full quantity of alkaloid with the contained salts and herewith give a summary of our experiments.

WATERY EXTRACT by boiling and concentrating to 1 in 1 extracted '0004% alkaloids i.e.—alkaloids practically negligible and total solid Ext 18.8%

ALCOHOLIC EXTRACT (Proof Spirit) as done according to Tropical School method showed '006% of alkaloids and 8'6% of total solids.

ALCOHOLIC EXTRACT with 90% alcohol.

(1) alkaloids obtained '0116%

(2) total solid residue 5'1%

So we find that with Proof Spirit the quantity of alkaloids obtained is $\frac{1}{2}$ of that obtained by 90% Spirit, but the amount of total extractive is double of that obtained by strong alcohol.

So by using spirit of different strengths we get inverse extract i.e. by strong alcohol we get full quantity of alkaloids but half the quantity of total solids and by Proof Spirit we get half the quantity of alkaloids but double the quantity of total solids than that obtained by 90% alcohol.

We tried to extract the full quantity of alkaloid and full quantity of total solids by various solvents and at last we have been successful.

A mixture of Glycerol and water was found to be most suitable and the **Glycerine Liquid Extract contains '01% alkaloid; and 22'4% of total solids.**

VARIATION IN THE TOXICITY OF ACONITE AFTER MITIGATION WITH COW'S URINE.

Process of mitigation.—

Mitigation is done by soaking slices of aconite root in cow's urine and exposing the whole in the sun. This is continued for three or more days, till the tough horny aconite root becomes so soft that it can be easily pierced by a pin. Cow's urine is daily changed and fresh urine added. In this process of soaking and exposing to the sun, the aconite loses a portion of the active principle, the remainder undergoes a chemical change which alters its physiological properties considerably.

Chemical changes after mitigation.—

Crude root of aconite contains about 1.4 p.c. of total alkaloid, whereas the mitigated aconite contains 1.27 p.c., that is there is a loss of 0.13 p.c. of the total alkaloid. Active principles of Aconite Ferox are (i) Aconitine, which is very poisonous & (ii) Pseudo-aconitine. And these active principles on being treated with cow's urine and exposed to the sun become hydrolysed and transformed into benzoyl-aconine and voratroyl-aconine, which are far less poisonous and have as we shall see later on pharmacological analogy to the alkaloids of the atropine group. But we can not definitely state the nature of hydrolysis or transformation product, which has made the physiological action so different in nature. It requires further chemical researches in this line.

Comparative Minimum Lethal Dose.—

Ordinary tincture aconite has a minimum lethal dose of 0.00045 c.c. per gramme body-weight of the guinea pig. The same dose was injected in white rats and the animals died between 1 and 1½ hours after injection.

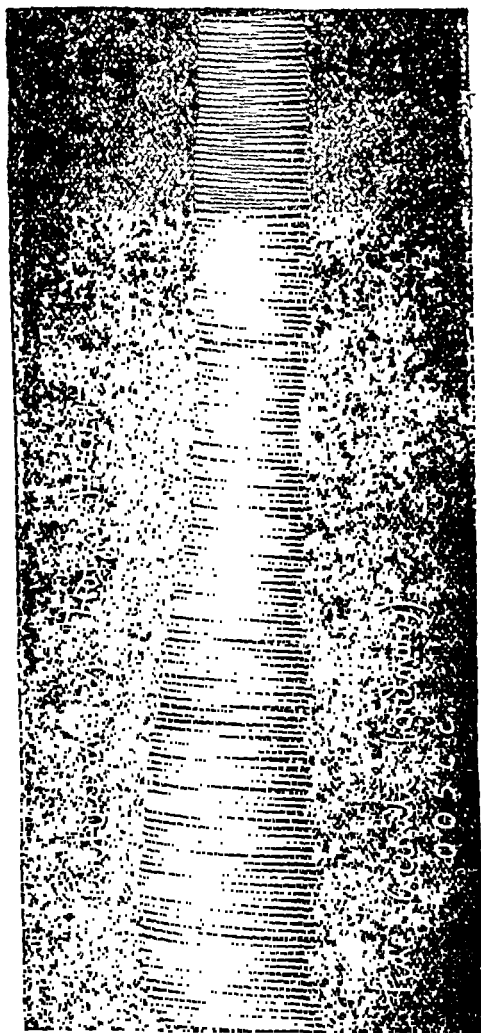
But in case of mitigated tincture aconite, a dose of 0.0025 c.c. per gramme body-weight of white rats was required to kill the animals after 3 hours of injection.

Thus it is seen that the mitigated tincture aconite is about five times weaker than ordinary tincture aconite.

Pharmacological Action on the Heart.—

Heart of frogs (about 300 grams weight) when perfused through the Inferior Vena Cava with 0.05 c.c. of ordinary tincture aconite, showed gradual depression of the cardiac muscle. (Graph I.)

GRAPH I.

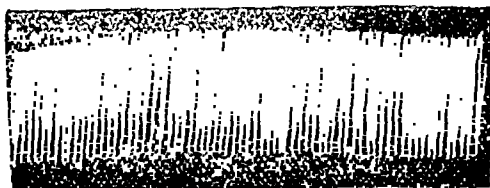


Note gradual depression of the heart.

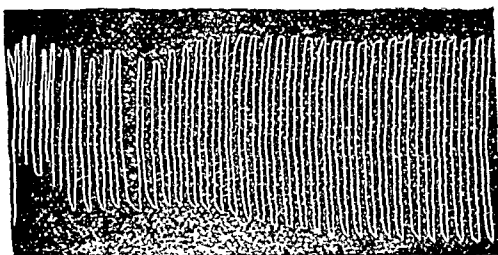
But the mitigated tincture aconite, 0.075 c.c. improved the condition of the heart and the following effects were observed.

- (i) Force of contraction was increased.
- (ii) Period of relaxation was increased.
- (iii) There was greater filling of the ventricle.
- (iv) Rate of heart beats slowed down.
- (v) Heart tonic unit was about 0.00025 c.c. per gram body weight. (Graph II.)

GRAPH II.



Normal.



After injection of mitigated Tr. aconite.



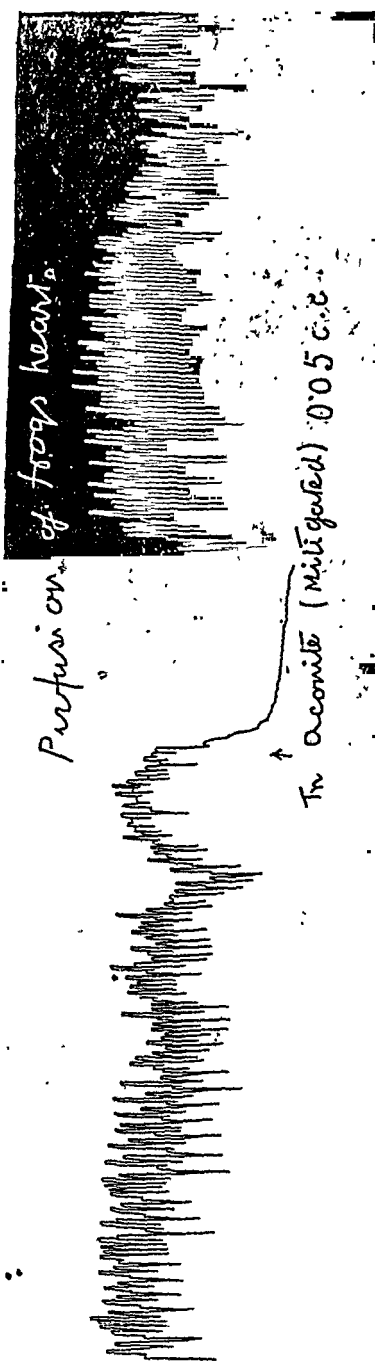
Note gradual slowing and increased amplitude of the heart.

Effect of Mitigated Aconite on irregularities of heart.—

0.05 c.c. of ordinary Aconite made the heart very irregular.

Then 0.05 c.c. of mitigated aconite was injected. The immediate effect was the complete stoppage of all movements of the heart. But after a few seconds the heart began to beat very regularly and more forcibly. But this condition of the heart did not last permanently and it became irregular again after sometime. (Graph III.)

GRAPH III.



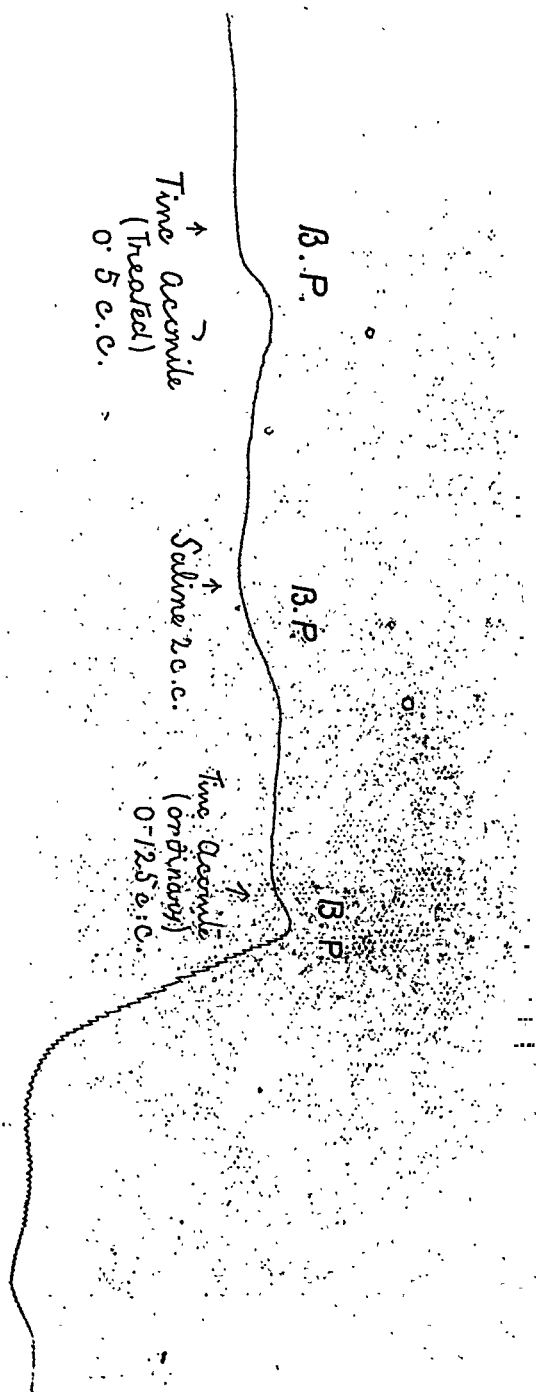
Note the effect of mitigated tinc. aconite in making irregular heart regular.

Effect on the Blood-pressure.—

With the ordinary tincture aconite, blood-pressure was lowered and heart made irregular with intravenous injection of 0.125 c.c. But with the mitigated tincture aconite, even with a dose of 0.5 c.c. there was no fall of blood-pressure and the heart was not affected in any way.

(Graph IV.)

GRAPH IV.



Note that 0.5 c.c. of mitigated Tr. aconite has no effect on the blood-pressure, but 0.125 c.c. of ordinary Tr. aconite produces marked fall of blood-pressure.

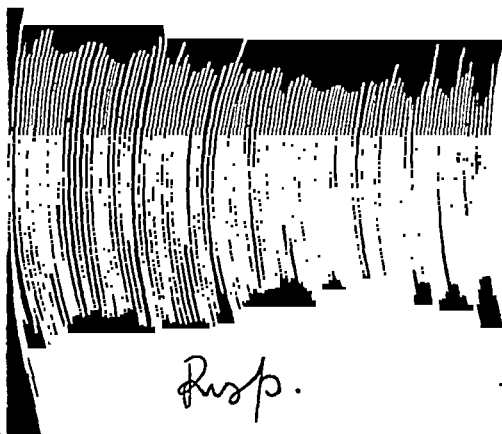
Antipyretic effect of mitigated tinc. Aconite.—

0.00025 c.c. per gram body weight controlled the rise of temperature artificially produced in guinea pigs with injection of cocaine.

Remarks—In Ayurvedic works, the mitigated aconite is called Amrita (अमृत) i.e. a substance which gives immortality to the body. In our experiments, we find that the Tincture made from mitigated aconite, acts as a tonic and restorer of the failing cardiac functions.

Conclusion.—With the above experimental datas, it is advisable to use the preparation made from mitigated aconite, as it is a cardiac Tonic, as well as Antipyretic.

Action of Ephedra Vulgaris (whole drug)



0.05 C.C of 0.7% Sol.
Liq. Ext. Ephedra.

Pulse Cat. 2.5 hr. later.
2.31 W. Brown.

GRAPH III.

Upper Tracing
Lower Tracing

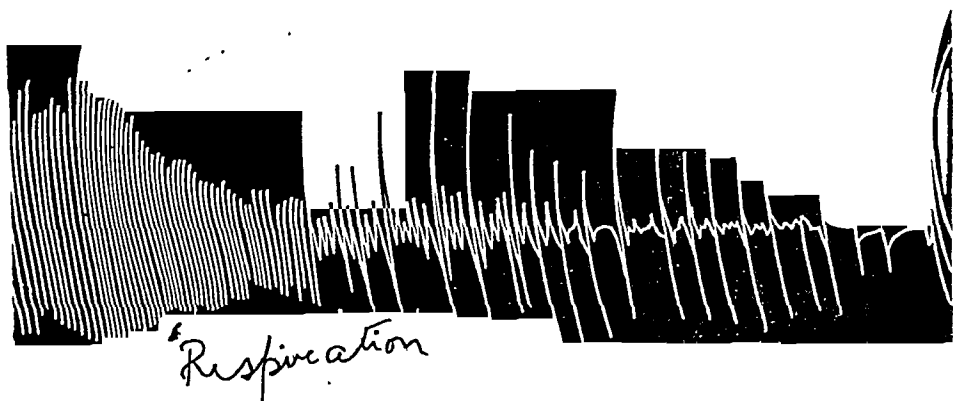
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Respiration.
Blood Pressure.

Note the slowing of the respiration and particularly mark that the blood pressure has not been affected.

Action of Ephedra Valgaris (whole drug)

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↑
0.1 c.c. of 0.7% Solution of
liq. Ext. of Ephedra.

Mel Cat, wt. 2.5 Mts. William
7.2.31. W. Barn

GRAPH II.

Upper Tracing
Lower Tracing

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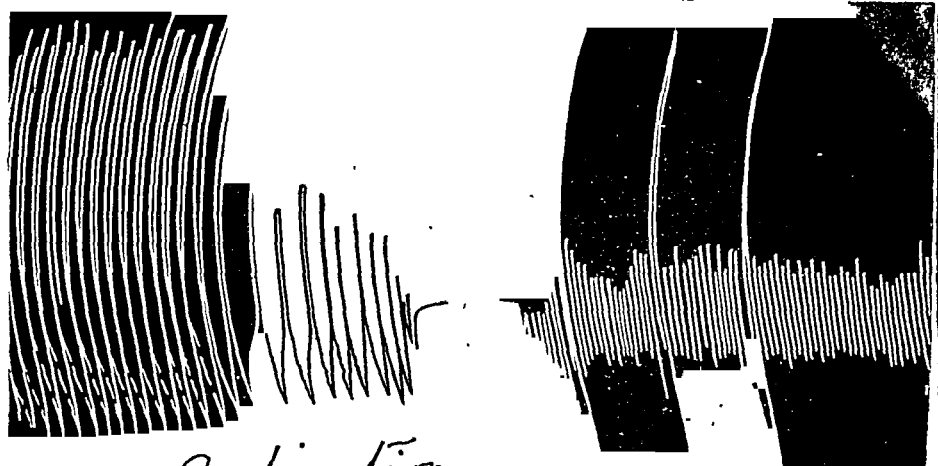
Respiration
Blood Pressure

Note the gradual slowing of the respiration and the continued action of the drug on this system.

Rise of blood pressure is usual.

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Action of Ephedra Valgaris (whole drug)




Respiration



Blood Pressure

↑
0.2 c.c of 0.7 % Solution of
Liq. Ext. of Ephedra

Male  wt. 2.5 Kilos. Wethane
7.2.31.
W. Barn.

GRAPH I.

Upper Tracing
Lower Tracing

Respiration
Blood Pressure.

Note gradual slowing of the respiration with the complete stoppage after sometime. Mark the continued action of the drug on respiration.

Rise of blood pressure is usual.

EPHEDRA VULGARIS.

The graphs mentioned in page 89 of the text, are reproduced in the following blocks with detailed drescription of our findings in the following pages.

As there is no plate in Dr. Basu and Kirtikar's, Indian Medicial Plants we reproduce reprint of the dried small twigs (after our original photo) taken in our laboratory.



Ephedra Vulgaris, dried small twigs (From original photo)

HOLARRHENA ANTIDYSENTRICA

(KURCHI BARK)

Kurchi Bark, is in *universal* repute all over India, as a medicine for bowel diseases.

Kurchi bark contains several ingredients, which so behave differently with different solvents but we could obtain all the so called active ingredients in solid extract form, if the bark be extracted with 90% alcohol in a continuous extraction apparatus. This solid extract is useful in all bowel troubles in 5 to 10 grain dose. and we have styled this alcoholic solid extract as *Kurchidine*.

1 lb of mature selected Kurchi bark yielded 30 grains of total alkaloids, 75 grains of Resin and gum and 270 grains of tannin. The above are the quantities obtained from 1 lb of Bark, when extracted on a manufacturing scale, but the bark actually contained much more.

This specimen, actually yielded 1.2% of total alkaloids on laboratory analysis. The Bark actually contained 84 grains of total alkaloids, of which 30 grains, could be obtained and utilised if the total alkaloids are to be used therapeutically.

The researches of Caius and Mhaskar have shown. that the different ingredients, viz. alkaloids gum and tanins, if administered separately to patients, suffering from bowel troubles (Diarrhoea and Dysentery Amoebic and Bacillary), gave good results, similar to other medicines used in the treatment of Bowel troubles.

The anti-diarrhoeal and anti-dysentric properties of the bark, are not dependent solely on any one particular, constituent in the bark—but on all the constituents i.e. alkaloid, gums, tannins &c.

We conclude therefore that the use of the whole drug kurchi bark in finely powdered form or in the form of a total solid extract should be used for therapeutic purposes.

HERPESTIS MONNIERA

(*A study of the whole plant*)

Description :—Marshy glabrous, often punctate herbs ; creeping, rather succulent ; branches 4-10 in. long rooting at the joints. Leaves $1\frac{1}{2}$ - $\frac{3}{4}$ in. opposite, fleshy, sessile, obtuse, entire in the Indian plant, ovate-oblong ; nerves very obscure ; lower surface dotted. Peduncles usually longer than the leaves, and 2 bracteoid. Flowers pale blue, purple-veined, single on alternate, axillary stalks. Calyx $\frac{1}{3}$ - $\frac{1}{2}$ in. long, 5 parted, upper sepal ovate, Corolla cylindric, twice as long ; lobes and stamens sub-equal ; style linear, stigma capitate, 2-lobed capsule included, ovoid, acute.

Chemical Composition :—Samples of the drug from different sources were analysed. It was found that all the specimens contain an alkaloid in varying proportions, rising to a maximum of about 0.04%. A sample of an allied drug known as "*Thalkuri*" (*Hydrocotyle Asiatica*) was also examined. It was found that it does not contain any alkaloid.

The alkaloid is fully extracted when macerated with Ether-chloroform mixture in the cold. Rect. Spirit requires prolonged maceration for complete exhaustion. Boiling water extracts only 0.01% of the alkaloid but when treated with boiling mixture of glycerol and water, 0.02% of the alkaloid is extracted.

Total alkaloid of :—

i. Brahmi leaves (dried)	...	0.05%
ii. „ stems (dried)	...	0.005%

Toxicity of the alkaloid :—

The alkaloid is highly toxic for lower animals, particularly in frogs where 0.5 mg. per 100 gramme body weight injected into the sublingual space kills the animals within a maximum period of 10 minutes. Rats and guinea-pigs require a higher dose, about 25 mg. per kilogramme body weight kills the animals within a maximum period of 24 hrs,

Toxic effects of the alkaloid :—

0.5 mg. per gramme body weight when injected in frogs produces strychnine-like convulsions immediately, and gradually there is paralysis of the hind limbs. Respiration fails first, but the heart continues beating very slowly and irregularly. It greatly depresses all the muscles of the body and the animal when placed on its back does not show any inclination to assume its normal position.

Pharmacological actions of the alkaloid :—

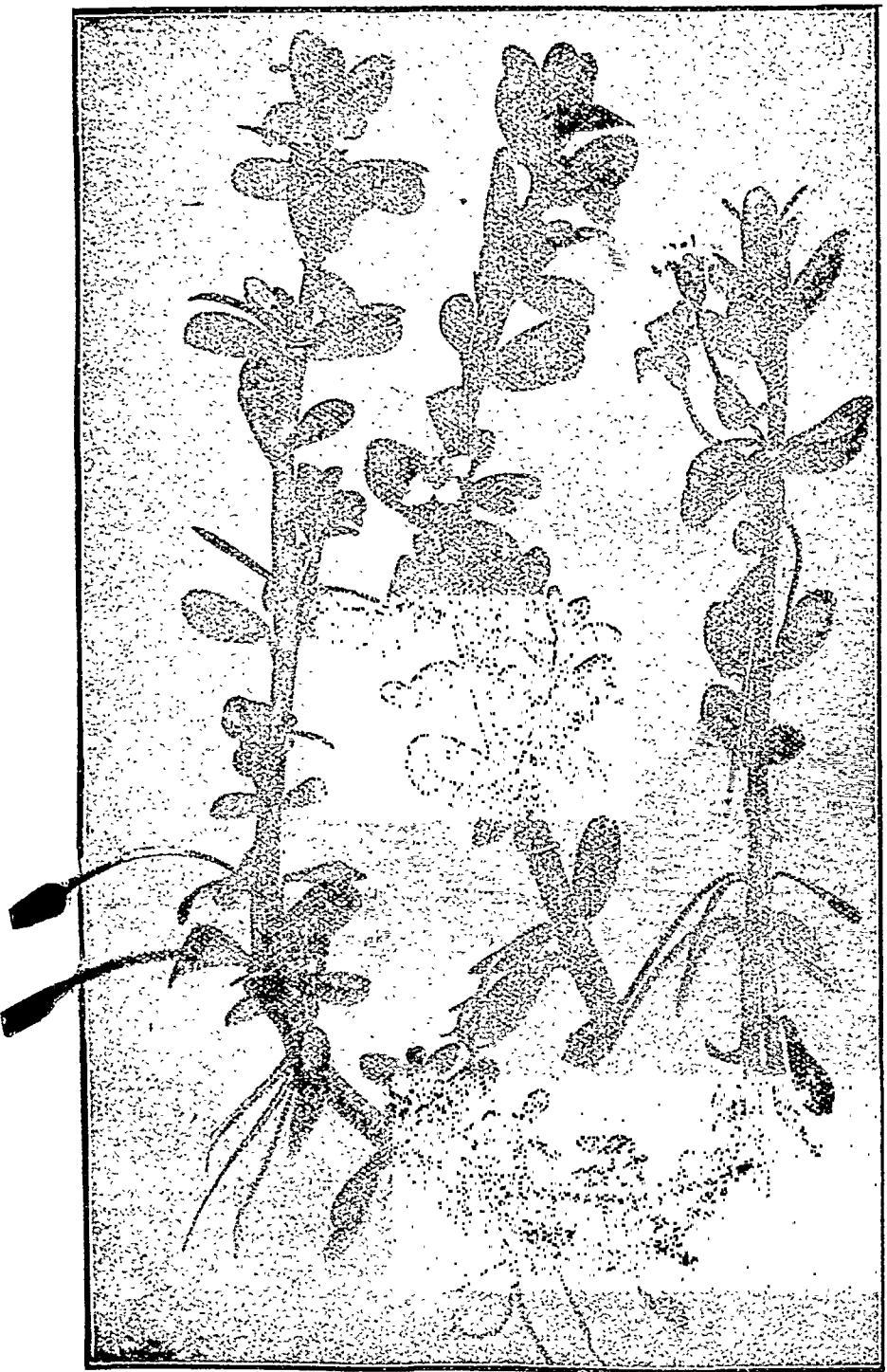
(a) *Blood pressure*—0.5 mg. to 1 mg. per kilogramme body weight of anaesthetised cat produced fall of blood pressure followed by gradual recovery. This fall is solely due to stimulation of the vagus nerves, as it is absent after paralysis of the vagal nerve endings with atropine. (Graph I and II).



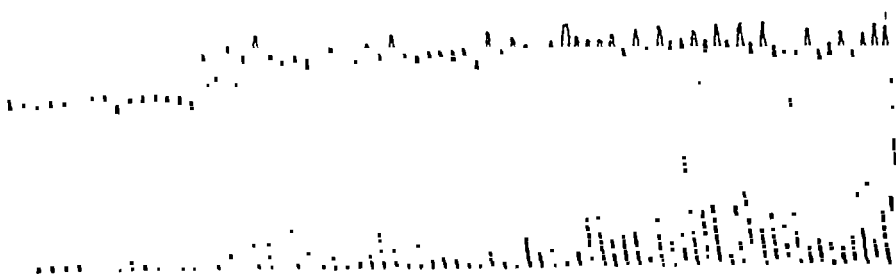
Blood Pressure
 Brahmi alkaloid 1mg.
 Male Cat, 2 kilos. Urethane.
 10.7.31. Basu.

Graph No. I

Note fall of blood pressure and stimulation of respiration



Herpestis monniera (*Brahmi*) grown in our Herbarium.



Respiration



Blood Pressure

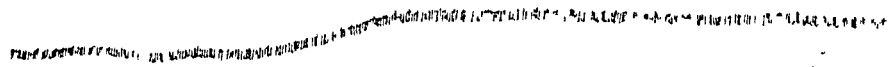
↑
Brahmi alkaloid 1 mg.
after atropine.
Male Cat, 2 kilos. Wulkane.
10. 7. 31. HBasu.

Graph No. II

Note the absence of the fall of blood pressure and the stimulation of respiration with the alkaloid when parasympathetic nerve-endings are paralysed with atropine.

Smaller doses produce persistent rise of blood pressure (Graph III) and this rise in the blood pressure is due to two factors.

Blood Pressure



↑
alkaloid of Brahmi 1/5 mg.
26. 6. 31. HBasu.

Graph No. III

Note Persistent rise of blood-pressure with small dose of the alkaloid.

i. Vaso-constriction produced by the stimulation of the sympathetic nerve-endings.

ii Stimulation of the cardiac muscles.

That the alkaloid stimulates the sympathetic nerve-endings is proved by the fact that the rise in blood-pressure is partially reduced after paralysis of these nerve-endings by Ergotoxine (Graph IV).

Respiration

Blood Pressure.

↑
Ext. Brahmi Liq. after Ergotoxine.
1/10 c.c. 1% Sol. W.Bass. 9.6.31.

Graph No. IV

Note the change in the effect of the blood pressure with small dose of the alkaloid when the sympathetic nerve endings are paralysed with ergotoxine.

(b) *Blood-Vessels*—Perfusion of the frog's blood-vessels after *Laewen-Trendelenburg's* method shows well-marked constriction in a dilution of 1 in 200,000 to 500,000.



↑
Perfusion of Frog's Heart with Brahmi Alkaloid
1 in 500,000. W.Bass

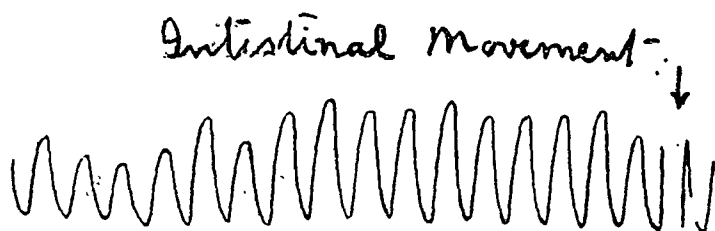
Graph No. V

Note the marked stimulation of the heart muscle of frog.

Kidney volume shows a constriction but the vessels of the liver seem to dilate.

(c) *Heart*.—Perfusion of the frog's heart through the Inferior Vena Cava after *Howell* and Cook's method shows marked increase in the force of contraction only with a dilution of 1 in 500,000 (Graph V). Any lower dilution immediately stops the action of the heart.

(d) *Respiratory system*.—The alkaloid stimulates the respiration through the parasympathetic nerve-endings, as this stimulation is absent after the paralysis of these nerve-endings with atropine (Graphs I and II).



Brahmi Alkaloid
1 in 200,000. 12.6 31. HBasu

Graph No. VI

Note stimulation of the plain muscles of the intestine.

(e) *Gastro-Intestinal system*.—The alkaloid stimulates the

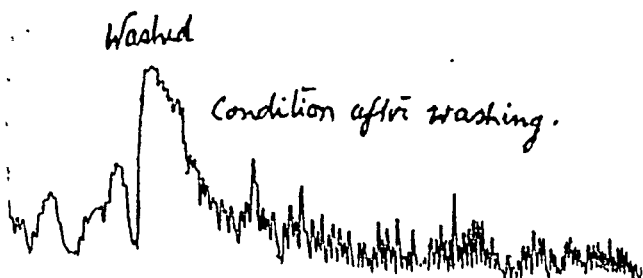
Intestinal Movement—



↑
Brahmi Alkaloid
1 in 250,000.
14.7.31. HBasu

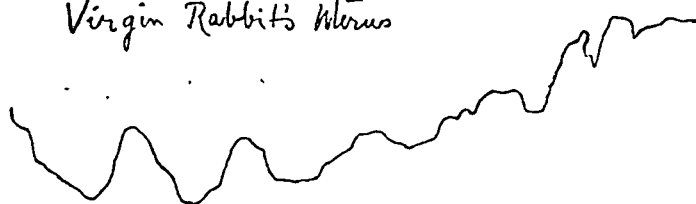
Graph No. VII

Note the regular movements of the intestinal muscle after application of the drug. movements of the intestine and makes the movements regular in a



dilution of 1 in 200,000 (Graphs VI and VII). Higher concentration relaxes the intestine.

(f) *Uterine system*,—The alkaloid has a marked effect on
Virgin Rabbit's Uterus



↑
Brahmi alkaloid
1 in 200,000.
9.7.31. HBasu.

Graph No. VIII

Note stimulation of the uterine muscle.

the uterine muscles whether the uterus is virgin, pregnant or

Guinea-pig's Uterus.



↑
Brahmi alkaloid
1 in 500,000.
22.7.31, HBasu

Graph No. IX

Note stimulation of the uterine muscles,

multiparous and the effect is mainly muscular. (Graphs VIII, IX, X). A dilution of 1 in 200,000 to 500,000 produces marked contraction and there is relaxation of the muscles in a concentration of 1 in 100,000.

*Guinea pig's Uterus
non pregnant.*



Brahmia alkaloid

1 in 500,000

23.7.31 H. Basu.

Graph No. X

Note stimulation of the plain muscles of the uterus.

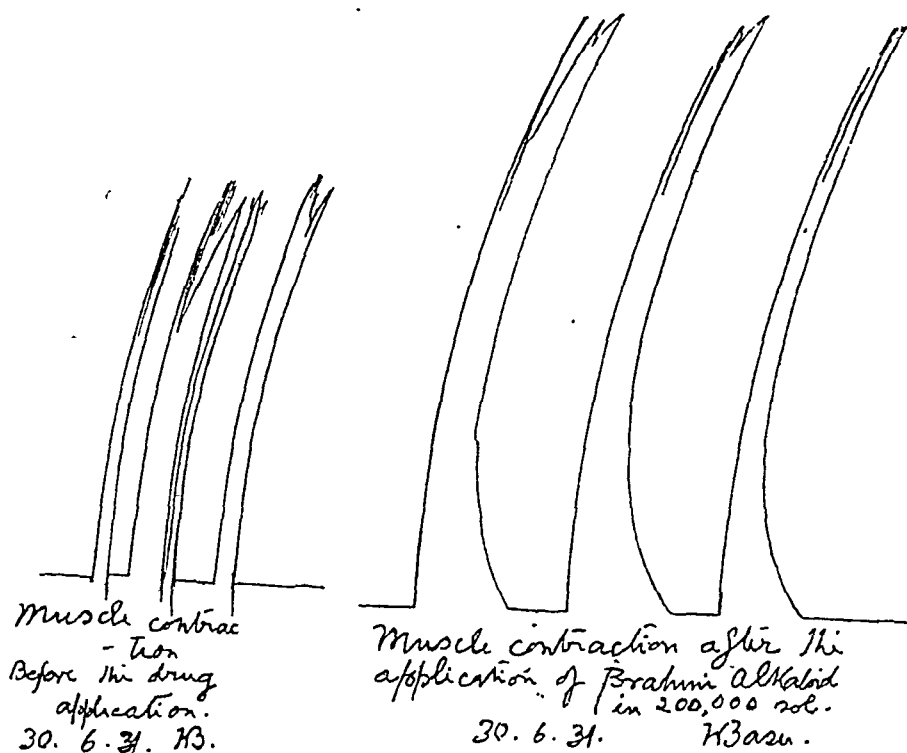
In order to test the effect of the whole drug, watery extract was prepared (1% sol.) and it was found to contain very small amount of the alkaloid.

Pharmacological actions of the whole drug run parallel with the alkaloid and only with a very big dose of this watery extract could depressant action of the alkaloid be obtained.

(g) Injection of 1 per cent solution of the alkaloid into the subcutaneous tissues or into the muscles of the lower animals does not produce any inflammatory change in the tissues.

(h) 0.1 per cent solution of the alkaloid when put into the eye of the rabbit, does not produce any corneal anaesthesia.

(i) *Muscular system*—In the nerve-muscle preparation the height of contraction is increased after the application of the alkaloid even in a dilution of 1 in 50,000 to 200,000 (Graphs XI and XII).



Note increased contraction of muscle after the application of the drug.

Graph No. XI & XII

Use of Brahmī in Medicine.

In my practice among the Up-country (Marwari) people I come across cases of Remittent Fever and other low adynamic conditions, where the pills made with the leaves of the BRAHMI plant combined with aromatics and in some cases with musk are administered largely by the Pandits and Marwari Kavirajs.

Whenever signs and symptoms of low vitality are noticed these Brahmī Pills are administered several times.

As the leaves contain the maximum amount of alkaloid, use of the powder of the dried leaves in 2 to 5 gram doses should be given a fair trial; It is less toxic than Strychnine and will not produce the reflex irritation, which is often noticed if Noxvomica or Strychnine be administered for a long time and Herpestis is a direct cardiac tonic whereas Strychnine

only indirectly stimulates the heart. Hence in all low conditions, where the heart becomes enfeebled this drug can be safely used for a long time to keep up the patient's strength.

It is always advisable to use the leaves (powdered) or decoction made with 5 times with of the leaves.

Summary and Conclusion.

1. Herpestis Monniera belongs to the natural order, *Scrophularincae*

2. It contains a powerful alkaloid, which we style "*Brahmine*", which in the dried leaves being 0.05% and in the dried stems 0.005%.

3. Toxicity of the alkaloid is very high. Frogs are killed within 10 minutes with a dose of 0.5 mg. per 100 grms. body weight. And rats and guinea-pigs are killed within 24 hours with a dose of 25 mg. per kilogram body weight.

Poisoning symptoms resemble very much like those of strychnine.

4. 0.5 mg. per kilogram body weight of cat produces fall of blood pressure through stimulations of the vagus. But about half of that amount of alkaloid raises the blood pressure through vaso constriction and stimulation of the cardiac muscles.

Alkaloid always produces stimulation of the respiration. And in a dilution of 1 in 200,000 to 500 000 it stimulates every other system.

5. Therapeutic dose of the alkaloid also resembles strychnine in its actions ; dose of the alkaloid *Brahmine* should range from $\frac{1}{5}$ to $\frac{1}{4}$ grain.

6. Watery extract contains only .01% alkaloid after boiling and therefore 5 times of the drug is to be used, if it is to be administered in decoction,

*Comparison of the action of "Brahmine" the alkaloid of
H. Monniera with Strychnine.*

	STRYCHNINE	BRAHMINE (alkaloid) H. MONNIERA
1. Fatal dose for Frogs ...	0.25 mg.	0.5 mg.
2. Dose for con- vulsion ...	0.25 mg.	0.5 mg.
3. Therapeutic stimulant dose ...	0.25 mg.	0.1 to 0.25 mg.
4. Poisoning symptoms ...	Reflex irritability increased. Tremors or involuntary twitches are seen in the limbs. Convulsions occur frequently before the animal succumbs. Respiration is stimulated. Blood pressure is raised. Heart-rate slows down.	<i>reflex irritability not in- creased.</i> Tremors or involuntary twitches are present in limbs. Usually 1 or 2 convulsions occur before the animal is dead. Respiration is stimulated. Blood pressure is lowered. Heart-rate slows down.
5. Pharmacological action ...	Blood pressure is raised due to vasoconstriction. Heart is not affected directly Respiration is stimulated. Movements of plain muscles of intestine and uterus in- creased. Muscular activity increased.	Blood pressure is raised due to vaso-constriction. <i>Heart is stimulated directly</i> Respiration is stimulated. Movements of plain muscles of intestine and uterus in- creased. Muscular activity increased.

RAWOLFIA SERPENTINA.

a study

Preliminary experiment for detection of Alkaloid, if any.

Samples of the roots were examined in various ways. In a preliminary experiment for the detection of alkaloid (if any) 10 grms of the finely powdered drug was digested in Prollins fluid (ether, chloroform, alcohol & ammonia) with occasional shaking for 24 hours. The fluid was then completely drained into a separator, the alkaloid extracted by shaking out with 1% HCl solution. Testing this above solution with usual reagents gave strong indication of the presence of an alkaloid.

Quantitative Estimation of alkaloids.

A quantitative determination was then conducted according to the method detailed in U.S.P. and the drug was found to contain about 1% total alkaloids.

Other constituents of the Drug.

A search for other constituents besides alkaloids, revealed that the drug contains a lot of resins and starch and when carefully incinerated it leaves an ash of about 8%, consisting mainly of potassium carbonate, phosphate and silicate and traces of iron and manganese.

The powdered roots were then treated with different extractive solvents and the resulting extracts were analysed.

(i) With water (on boiling). Very little alkaloids were extracted. Some portion of resins comes in the watery extract.

(ii) Maceration with cold rectified spirit failed to exhaust the drug completely of its alkaloids. Only 0.7% alkaloids and a good deal of resin were extracted.

Purification of the Alkaloids.

(iii) The chloroform of the extract of the drug was distilled over water-bath, the residue was taken up with HCl dil. (At this stage it was observed that the alkaloid and the accompanying resin gave a very marged green fluorescence when a portion of the above acid solution was treated with chloroform.

The above fluorescence disappeared when a salt of the alkaloid was formed and taken up in acidulated water or alcohol).

Now the bulk of the acid solution was carefully neutralised with sodium carbonate. The resinous matter deposited was filtered off, the filtrate shaken with ether and after being made alkaline with Na_2CO_3 was left overnight. The crude alkaloid deposited was dissolved in dilute HCl and reprecipitated with the addition of drops of ammonia solution which deposited the alkaloid as a flocculent yellowish white precipitate. The substance was then dried over vacuum. For further purification it was again dissolved in absolute alcohol, which left out the ammonium sulphate and other inorganic salts.

Properties.

The alkaloid was found almost odourless and dark brown in colour. But the salts were generally white or yellowish white.

The alkaloid is almost insoluble in dry ether.

(iii) Repeated hot extractions of the drug with chloroform completely exhausted the drugs of its alkaloids. The percentage of alkaloid extracted being 1931 about 1% of the whole drug. Here too, a lot of resin accompanied the crude alkaloid extracts.

R. *Serpentina* contains two different alkaloids with different melting points but their actions are alike as determined by experiments quoted below with graphs.

(i) *On the blood-pressure* :—The alkaloids produce fall of blood-pressure which is mainly due to vasodilatation.

(ii) *On the heart muscle* :—They have a depressant action and this is also a factor in producing a fall of blood-pressure.

(iii) *On the blood vessels* :—They decrease the tonus of the peripheral vessels, which is the main factor in producing the fall of blood-pressure. The alkaloids have no effect on the vessels of the kidneys, but these dilate the vessels of the intestines and liver.

(iv) *On the respiration* :—The alkaloids produce some stimulation which is not due to either central stimulation or circulatory disturbances but seems to be due to direct stimulation of the bronchial musculature.

(v) *On the intestines* :—The alkaloids produce immediate and definite relaxation.

(vi) *On the uterus* :—On the virgin cat's uterus the alkaloids produce relaxation but on the multiparous or the pregnant uterus there is contraction.

(vii) 1% solution of the alkaloids injected under the skin or deep into the muscles did not produce any inflammatory change in the tissues.

(viii) 1% solution of the alkaloid dropped into the eyes of rabbits did not produce any inflammation of the conjunctive and did not produce any anaesthesia of the cornea.

(ix) The alkaloids did not produce any hypnotic effect on the different species of lower animals experimented upon whether it was given per mouth through a stomach tube or injected intravenously.

Regarding the effect of alkaloids on the stomach as an irritant, late Rai Bahadur C. L. Bose M.B. observed in the Pharmaceutical Journal of 1892 that 0.15 gm. of the alkaloid dissolved in three drops of acetic acid diluted with about two drachms of water, and injected into a cat's stomach produced vomiting within 16 minutes.

But in our series of experiments alkaloids in small doses did not produce any irritation of the stomach whether the alkaloids were given per mouth or injected into the animal.

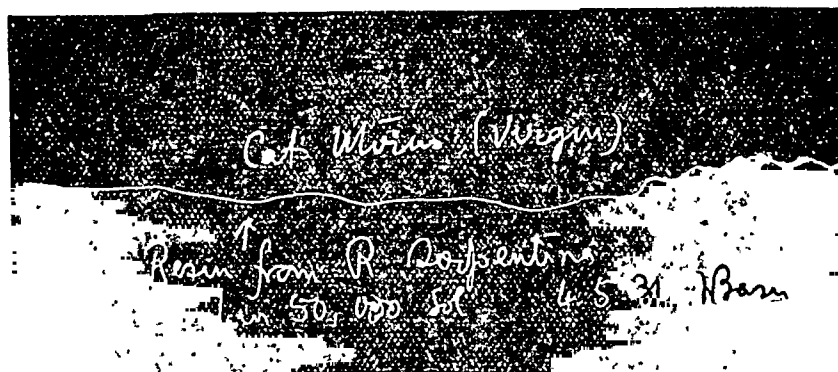
It appears that the fact observed by the late Rai Bahadur regarding the effect of the alkaloids as gastric irritant is a toxicological phenomenon, which is also apparent from the dose of the alkaloids used in his experiment. This was .15 gram (about 100 grains of the powder) which for a cat should be more than lethal dose.

Effect of the Resins of *R. Serpentina*

Resins have got no effect on the blood pressure or respiration nor has it any depressant effect on the cardiac muscles.

But on the plain muscle of the uterus it has peculiar and entirely different effect. It stimulates the uterus of virgin cats.

And this action seems to be due to direct stimulation of the uterus



Graph No. 1

Note stimulation of uterine muscles with the Resin from R. Serpentina.

muscles (See Graph I). The Resins were also tried for hypnotic effect but without any positive result.

Effect of the whole drug

To test the effect of the whole drug watery extract of 1 in 1 was prepared.

The watery extract has no action on any system and this also failed to produce any hypnotic effect on experimental animals.

Antipyretic effect of R. Serpentina.

R. Serpentina is said to be a good remedy for fevers. But the alkaloids failed to control any rise of temperature artificially produced in lower animals.

Site of Action of the Alkaloids.

As has been pointed out before, the fall of blood pressure after the injection of alkaloids was mainly due to vaso-dilatation (Graph II) and partly due to depressant action on the cardiac muscles.

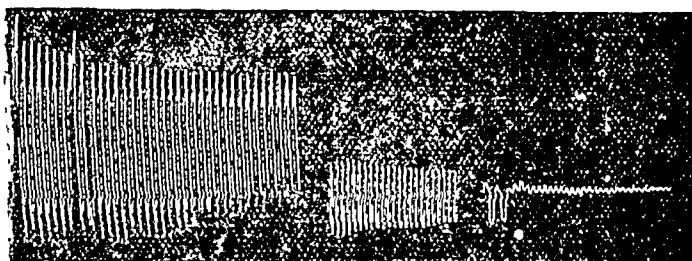
Fall of blood-pressure is not due to any vagal effect as it persists even after paralysis of the the vagal nerve-endings with atropine (Graph III).

But the fall of blood-pressure is very slight after vaso-dilatation with Nitro-glycerine (Graph IV).

That there is vasodilatation after the injection of the alkaloids

is also seen in the perfusion of frog's legs after *Laewen-Trendelenburg* method where vasodilatation is indicated by the quickening of the flow. The flow was quickened from 60 to 100 drops per minute when the alkaloids were injected in a dilution of 1 in 20 000.

Perfusion of the frog's heart *in situ* after the method of *Howell* and *Caok* showed gradual depression of the heart in dilution of 1 in 20,000 (Graph V).

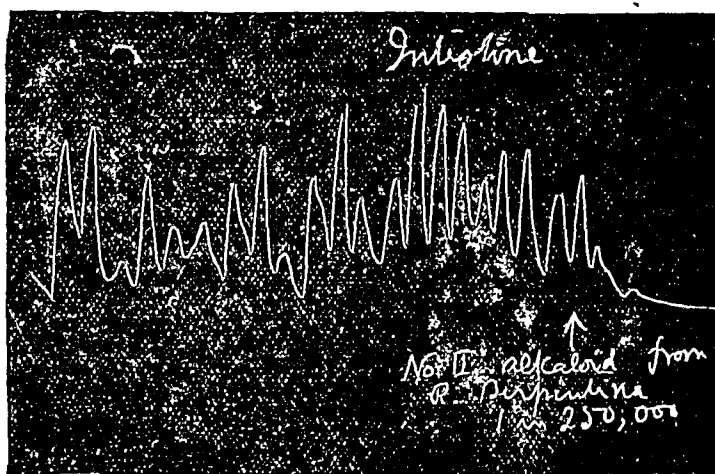


Graph No. V

Note gradual dipression of the heart muscle.

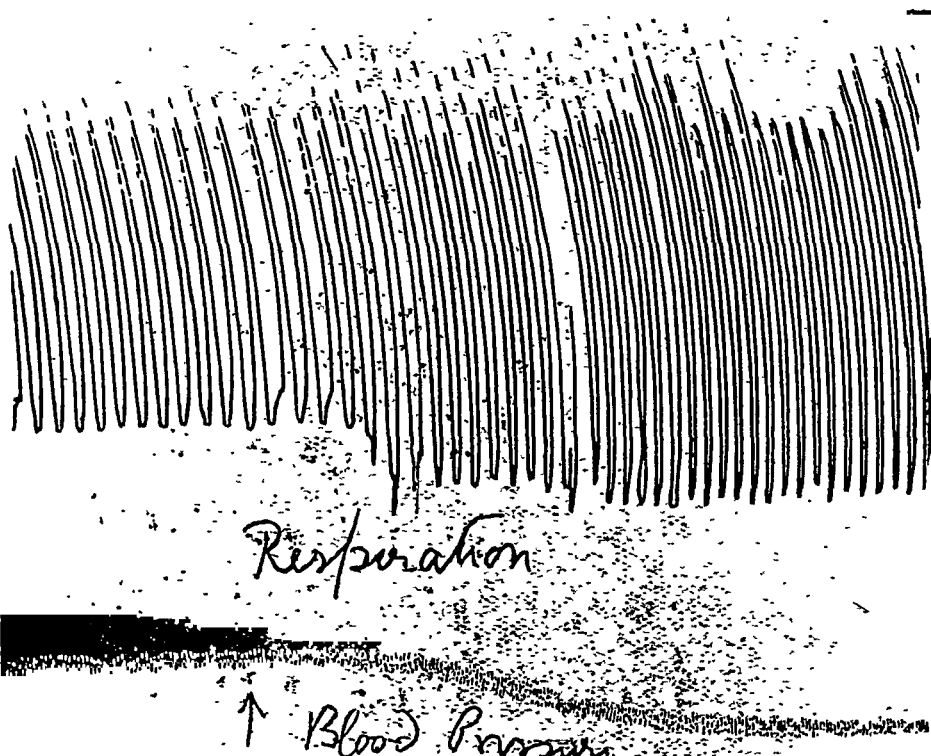
Stimulating effect on respiration is not due to the action on vagus as it persists even after the use of atropine (Graph III and IV), but the effect seems to be due to direct stimulation of the bronchial musculature.

From the nature of the effects of the alkaloids on intestines



Note relaxation of the intestinal muscle.

Graph No. VI



Respiration

↑ Blood Pressure

Alkaloid 8 mgrms—Male Cat wt 2.7 Kilos Urethane.
Note fall of Blood-Pressure and stimulation respiration
after injection of the alkaloid.

Graph No. II

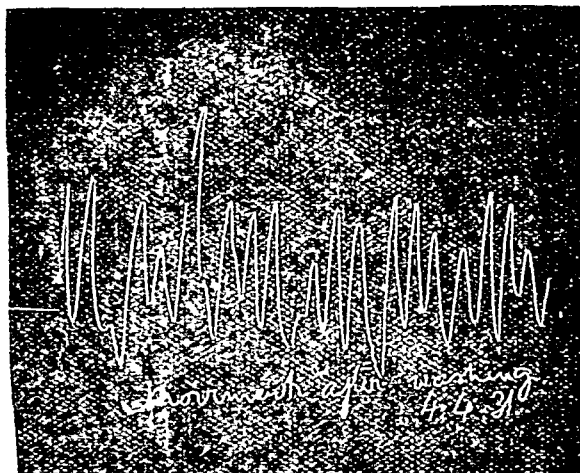
Respiration



Blood Pressure

4 mgrms after atropine Female Cat 2-7 Kilos Chloretone.
Note fall of Blood-Pressure and stimulation of Respiration even after paralysis of
parasympathetic nerve-endings with atropine.

and uterus, it can be safely concluded that it is due to stimulation of the sympathetic nerve-endings. Alkaloid even in a dilution

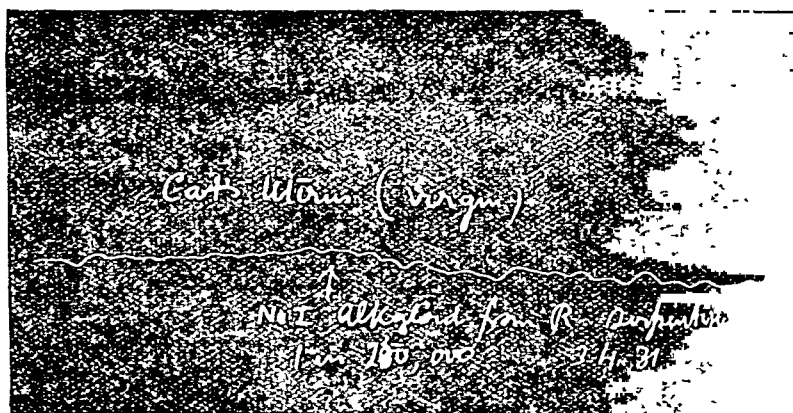


Graph No. VIa

Note the condition after washing.

of 1 in 250,000 immediately stopped all movements of the intestines (Graph VI) which again reappeared after washing of the drug. (Graph VIa)

And the same dilution of the alkaloids showed relaxation of



Graph No. VII

Note relaxation of virgin uterus with the alkaloid.

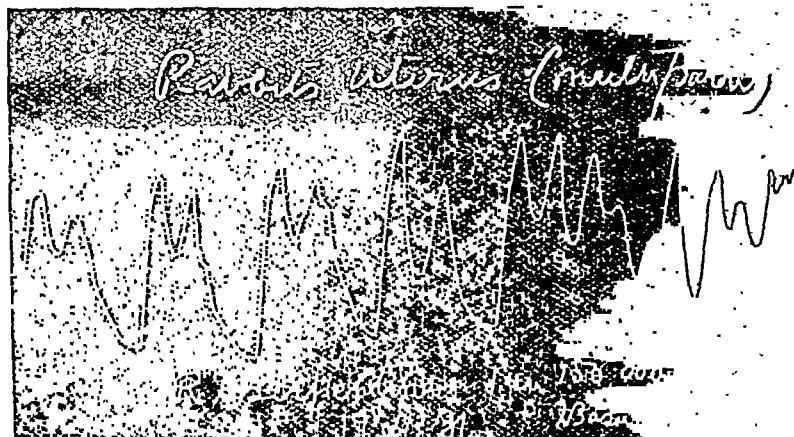
the uterus of the virgin cat (Graph VII), and a concentration of 1 in 50,000 *stopped all movement** and completely relaxed the



Graph No. VIII

Note relaxation and complete stoppage of all movements in higher concentration.

same uterus (Graph VIII). Multiparous rabbit's uterus showed contraction with the alkaloids in a dilution of 1 in 150,000 (Graph IX).



Graph No. IX

Note contraction of the multiparous uterus with the alkaloid.

Clinical observations.

General effects on the system as observed on patients :—

(a) *On the Alimentary tract* :—In a small percentage of cases, R. Serpentina produces irritation on the whole of the alimentary tract when the powder is given in doses exceeding 20 grs. In a few delicate patients this bitter drug causes nausea and vomiting immediately and the medicine is wholly or partly thrown out. This is not so important as such effect is found only in a few delicate cases (very few perhaps). Even vomiting and diarrhoea with profuse perspiration and small feeble pulse may temporarily occur.

(b) *On the Heart-muscle* :—R. Serpentina causes a slight depression of the heart-muscle when it is used for a long time but the effect is slow and passes off quickly when the use of the drug is suspended. The depression is due mainly to its cumulative effect. That the effect is directly on the heart-muscle has been shown by its pharmacological action.

(c) *On the circulation* :—The drug acts by slowing the pulse generally and reducing the volume of the pulse. The latter is, as we have seen, due to its action on the vaso-dilator mechanism of the autonomous nervous system.

(d) *On the nervous system* :—With small doses there is a marked action on the blood-pressure caused by general vasodilatation but no hypnotic effect. Very occasionally, a patient would fall asleep even with 10 grs. With large doses (above 20 grs.), there is a marked hypnotic effect. Usually the sleep produced by the drug is sound and refreshing. It may be prolonged to 10 or 12 hours when large doses are employed. The drug has a very marked depressing action on the sexual centres. In large doses and in a few very susceptible cases tremors of the hands and feet have been found to occur after prolonged use, but this effect was only temporary and disappeared soon after the medicine was stopped.

(e) *On the Respiratory system* :—In a few susceptible cases, R. Serpentina produces an abundant watery secretion in the bronchial tubes and sometimes acts like potassium iodide in this respect. It should be effective in some cases of asthma, with high blood-pressure.

TERMINALIA AURJUNĀ.

Physiological Study of the whole Drug.

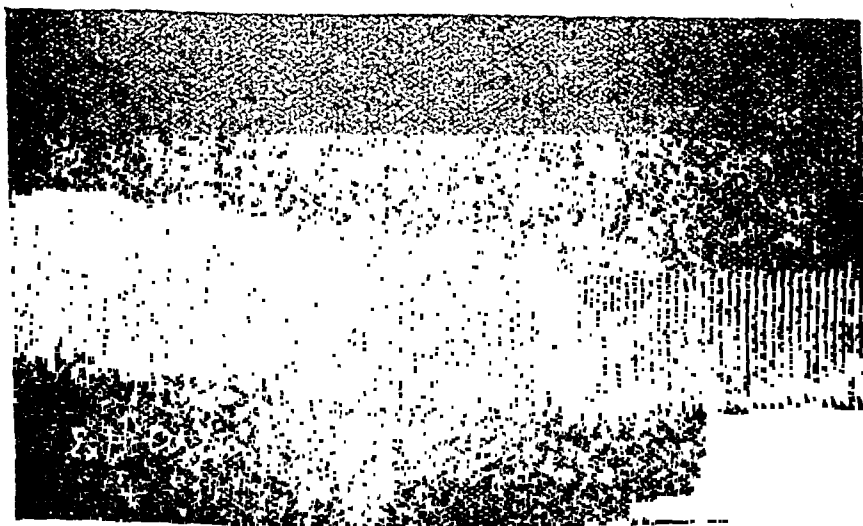
The chemical composition of the drug, obtained by different research workers, is of a conflicting nature.

Our observation, shows the presence of a body glucosidal in nature, besides Tannin and a large percentage of Calcium.

Pharmacological Finding.—The isolated glucosidal body has been found to be inert.

With the watery extract of the whole drug (1 in 2), there is a marked rise in the blood pressure, which persists for a long time. (Graph No. I)

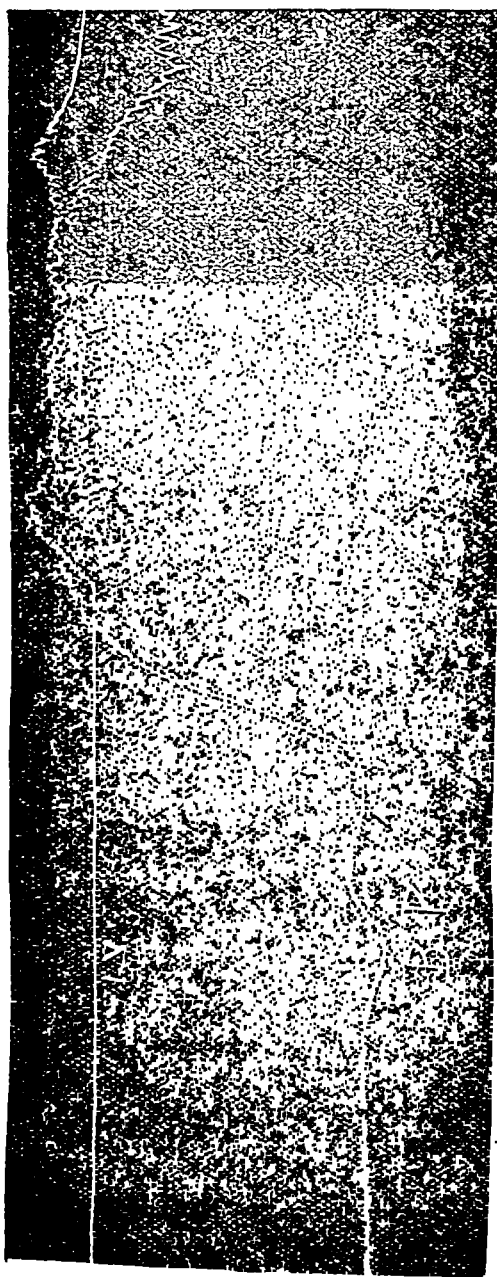
On the normal heart muscle there is no change when the watery extract of the whole drug is perfused through the Inferior Vena Cava (Graph No. II).



Graph No. II

Effect of the drug when the heart is normal.

Note—there is practically no change.

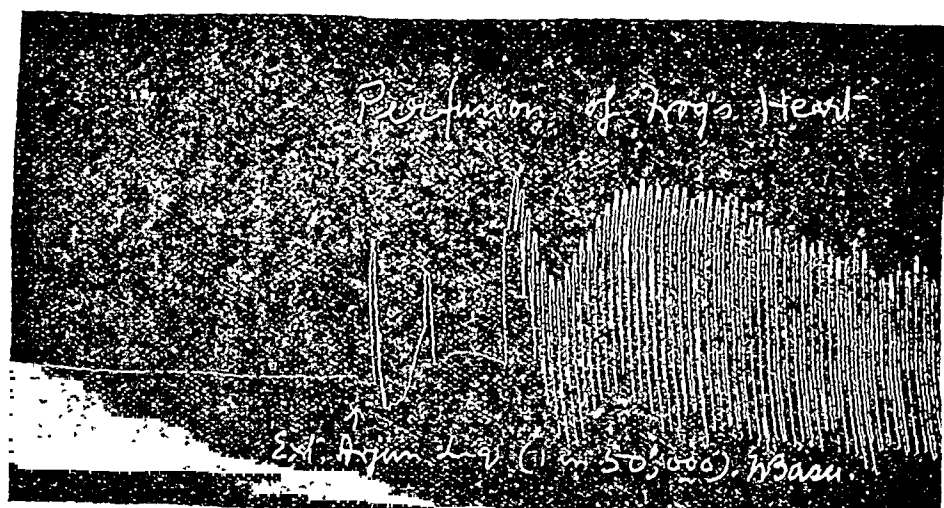


Graph No. I

Effect of Ext. Arjun Liq. (1 in 2). (Watery Extract)

Note the persistent rise of blood-pressure & dilatation of the intestinal volume.

The effect of the drug is most marked when the condition of the heart is made very low, after injection of Tr. Aconite.



Graph No. III

Effect of the drug when the heart is stopped with Tr. Aconite

From the above observations, we conclude that the drug is to be used either as fine powder of the whole drug or as freshly made infusion.

HYGROPHILA SPINOSA.

Preliminary Study

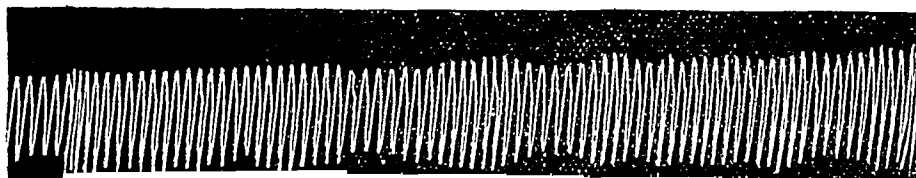
Chemical Composition.—

Hygrophila Spinosa powder when incinerated, leaves an ash of about 16% and this consists mainly of Potassium Carbonate and silicate with Iron, Calcium and traces of manganese. The alcoholic solution of the drug deposits a white **resin** on partial evaporation. This body is decanted from weak alcohol and then purified by washing with chloroform and petrol. The resin is soluble in water. An extract of the whole drug in boiling water reduces Fehlings solution direct, thus proving the presence of a body **Glucoside** in nature. And besides the resin and Glucoside, the drug contains a very potent **alkaloid** to the extent of 0.01%.

Pharmacological actions of the whole drug.—

In order to test the effect of the whole drug, watery extract was prepared (1 in 10) in boiling water.

0.5 c.c. of this solution per 100 grms weight of frogs had no effect on the animals till 24 hours. But 1 c.c. per 100 grms.



Resp

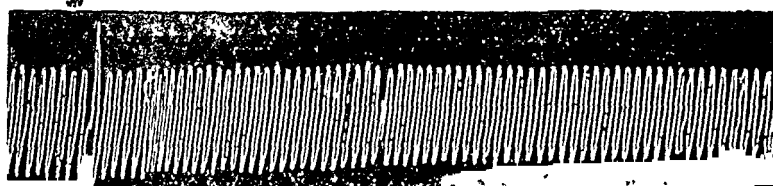
B. P.

↑
H Spinoso 0.1 c.c. g/10 p.c. solution.
Female wt. 2.2 Kilo. 10.9.31.

Graph No. I

Note the persistent rise of blood-pressure, but the respiration is not affected.

killed the frogs in 24 hours. 1 c.c. of 1% solution per kilogram body weight of the rabbit was injected through the ear vein, and the animal was found to be in a drowsy state after 24 hours with



Rest

B. P.

↑
H. Spinoza 0.1 c.c.
1 in 1 solution

after atropine

Female Cat. 2.2 Kilos 10.9.31

W. Baer

Graph No. II

Note the persistent rise of blood-pressure after atropine.

the heart beating slowly and irregularly. 2nd injection of 0.75 c.c. killed the animal after 3 hours and on post-mortem examination, ventricles were found to be absolutely empty and the auricles full of blood.

1 c.c. of the solution injected through the femoral vein of an anaesthetised cat (wt. 2.2 kilog) produced persistent rise of blood pressure (see Graph 1) and this rise was present even after paralysis of vagus nerves with atropine, after paralysis of the sympathetic nerve-endings with ergotoxine and complete vasodilatation with Nitroglycerine (see Graphs II, III, IV.). Thus

the rise of blood pressure is only due to stimulation of the cardiac muscles which is also evidenced from the following Myocardiographic experiments.



K. V.

Ex. 1

25.9.31

W. Basu

Graph No. III

Note the persistent rise of blood-pressure after Ergotoxine.

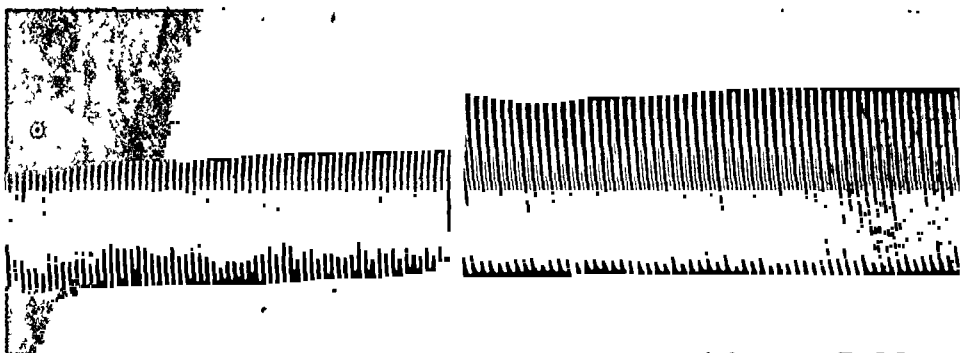
Perfusion of frog's heart muscle through the Inferior Vena Cava in a dilution of 1 in 250,000, in 100,000 produces gradual increase in the force of contraction with greater filling of the cavities (see Graph V.) Later there is slowing of the heart beats and finally there is heart-block (see Graph VI.). Almost the similar phenomena are observed in mammalian hearts also.

But the action of the drug is not so evident in normal hearts but is most marked as in the cases when the heart is in abnormal state. On the irregular and depressed condition of the heart the drug has a very well-marked action (see Graph. VII.)

Due to general acceleration of the blood current from the increased efficiency of the heart, the drug acts as a very good diuretic.

On the plain muscles of the uterus and intestine, it has practically got no action, except slight depression of the intestinal muscles.

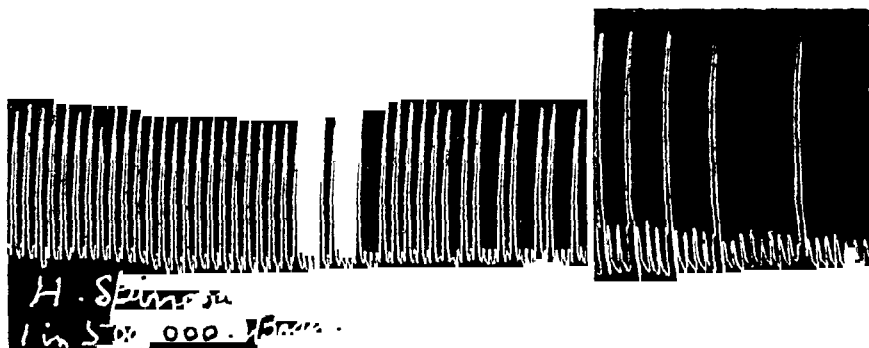
Graph No. V



Normal Heart Tracing of Frog.

After H. Spinsa 1 in 500,000. Note increase in the force of contraction.

Graph No. VI



Note gradual slowing and development of heart-block.

From the above experiments it can be seen that the action of drug has a very close resemblance with that of **Digitalis** on the heart, Hygrophila Spinosa slowing the heart rate at the same time increasing the force of contraction and prolonging the period of diastole.

Of the three main constituents of Hygrophila Spinosa, Resin is the least effective while the alkaloid is the most powerful one in its pharmacological actions. Actions of both the glucoside and the alkaloid on the heart of lower animals are similar to those of the whole drug.

THERAPEUTIC INDEX

V—vegetable, M—mineral, A—animal portion.).

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Infusion of catechu as injection ...	(V) 14
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Aegle marmelos ...	(V) 27
Asparagus Racemosus (juice taken with milk)	(V) 41
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Ananda bhairaba Rasa	(M) 44
Brihat Bangeswara Rasa	(M) 44
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Svarna Banga with the juice of raw turmeric or juice of the leaves of yagna-dumbur	(M) 52
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Devdari kvatha ...	(V) 69
Cinnamomum Tamala	(V) 74
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Haematemesi		Mukta bhasma ... (M)	58
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Garlic with common salt (V)	31	Devadaru with ginger (V)	69
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Piper Betle ... (V)	136	Berberis Asiatica ... (V)	46
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Apang as talisman...	(V) 18
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Allium cepa juice	... (V) 29
Allium sativum (applied to the nose)	... (V) 31
Decoc. of garlic in milk	(V) 31
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Diamond Bhasma with gingerroot juice and honey	(M) 57
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Sri mahalakshmi bilasa Rasa	... (M) 20
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Svarna Banga with 4 grs. of powdered root of mimosa pudica	... (M) 52
Banga Bhasma with the juice of apamarga leaves	(M) 51
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Diamond bhasma	... (M) 57
Datura Seeds	... (V) 84
Tribulus Terrestris	... (V) 187

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Acorus Calamus	... (V) 23
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Datura Fastuosa	... (V) 83
Herpestis Monniera	(V) 106
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Rasa-Raj Rasa	... (M) 11
Punarnava decoction	(V) 50
Cannabis Sativa (powder of dried leaves.)	... (V) 61
Pippali with honey	(V) 139

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Aloe (snuff of its juice)	(V) 33
Punarnava (juice of the leaves)	... (V) 50
Banga Bhasma with clarified butter.	... (M) 51
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Gandhaka Grita ...	(M) 16
Gandhakadi Taila ...	(M) 16
Corrected Sulphur with neem bark or leaves	
Churna ...	(M) 17
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Boerhaavia Diffusa (as ointment) ...	(V) 49
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Abrus Precatorius leaves with Chitraka-mula as paste	(V) 9
Realgar (mixed with the ashes of Achyranthes Aspera) ...	(M) 32

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Acacia Arabica bark-wash ...	(V) 12
Lauha bhasma ...	(M) 23
Shilajatu with milk ...	(M) 38
$\frac{1}{2}$ to 2% Alum Solution douche ...	(M) 39
Swarna Banga with the decoction of red Sandal wood ...	(M) 52
Reduced Zinc with butter or triphala ...	(M) 54
Alkusi seeds ...	(V) 119
Powdered Amlaki seeds with sugar and honey ...	(V) 133
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Aconite as liniment	(V) 19	Aloe Barbadensis ...	(V) 32
Acorus calamus ...	(V) 23	(dissolved in water with borax. The lotion is applied to the eyes in catarrhal and purulent ophthalmia)	
Adhatoda vasica ...	(V) 24	Adhatoda Vasica ...	(V) 24
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Mandoor ...	(M) 27	(Gonorrhoeal) Alum lotion (4 gr. in 1 oz. of water)	(M) 39
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Gandhaka Rasayan (M) 15		Aloe Barbadensis ... (V) 33	
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Pongamia glabra ...	(V) 147
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Cannabis Sativa ...	(V) 60
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Shinhanad guggula...	(M) 15
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Allium Sativum ...	(V) 31
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Ipomaea Turpethum (V) 115		A decoction of garlic in
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Palash seeds (as a paste		Gandhaka Ghrita ... (V) 16
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Cassia fistula (leaves		Corrected sulphur with
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Ocimum Basilicum (juice		Ta'lakesari rasa ... (M) 34
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Adhatoda Vasika ... (V) 24		chu dissolved in water
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Methi (Inf. of the seeds)	(V) 189	sore, sore-throat ...	(V) 176
		Terminalia Belerica	
Sores		(dried pulp roasted, kept	
		in the mouth as lozenges,	
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sore-throat) ...	(V) 6	Terminalia chebula	(V) 182
(Bed-sore) Acalypha		(ash mixed with butter	
Indica (powdered leaves		applied as a ointment	
dusted) ...	(V) 16	for sores)	
Aconite ...	(V) 19		
(in sore-throat,)		Spermatorrhoea	
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(in sore-throat)		Banga bhasma with	
Mon-chhal ...	(M) 32	nutmeg and ghee... (M)	51
(applied to fistulous		Svarna Banga with cubeb	
sores)		powder 12 grains... (M)	52
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(sore-throat)		Sida cordifolia ...	(V) 167
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(in syphilitic cachexia

and foul syphilitic ulcer)

Argyreia speciosa (pow-
dered root in milk) (V) 39

Triphala guggula ... (V) 43

Calotropis gigantea (fine
powder of root bark) (V) 57

Berberis Asiatica ... (V) 46

(in chronic syphilitic
cachexia)

Musk ... (M) 66

Cassia Tora ... (V) 68

Devadari kvatha ... (V) 69

Ficus glomerata (perforated
palate due to syphilis)

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Asafoetida ... (V) 94

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(bark is chewed)

Piper nigrum (a paste of
black pepper with water)

... (V) 140

Gingiber chewed ... (V) 200

Tuberculosis

Adhatoda Vasika ... (V) 24

Allium Sativum ... (V) 31

(Prophylactic against
tuberculosis.)

Shilajatu ... (M) 38

(in intestinal tuberculosis.)

Swarna Bhasma with juice
of Ay'apan, garlic or of

cactus grandiflorus (M) 43

Copper sulphate ... (M) 48

(Diarrhoea of tuberculosis.)

Bombax Malabaricum

(taproot) ... (V) 52

Abhra Bhasma with honey

and some vehicle as the

fresh juice of Vasaka (M) 19

Reduced Zinc with long pe-

pper and honey ... (M) 54

(in dyspepsia of T. B.

patients.)

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CONCLUDING REMARKS.

Every civilised country has got a Pharmacopoeia of its own ; whereas this vast Continent of India, being under alien rule, has up till now none of its own to stand by.

The Drugs Enquiry Committee of 1931 have submitted their Report, recommending the compilation of an Indian Pharmacopoeia. As it may be expected that in the near future India may after all possess a Pharmacopoeia of her own, the author has herein made an attempt, in his own humble way, to frame a skeleton for such a Pharmacopoeia. He therefore offers no apology for naming this book as PHARMACOPOEIA INDICA. His main object has been to bring before the medical profession a collection of the commonly known Indigenous Drugs in use mostly on this side of India.

The Drug resources of India are practically unlimited because, as Dr. R. C. Ray. has justly said, "India is an epitome of world climate and soil". Every Province, nay every district, is rich in indigenous drugs, whose local use as specific in certain specified diseases, has the sanction of age and experience but which, alas, are fast fading from peoples' memory. The author appeals to all persons, who are in possession of any definite knowledge about any such specific remedy for a particular disease, to publish such knowledge for the benefit of suffering humanity.

For this purpose the author will most gladly take up the Chemical Investigation and Pharmacological study of any drug that will be sent to him and will acknowledge the source of the drug and of the information, as well as the name of the person sending the drug and communicate to the sender all the findings before publication of the report.

The Appendix embodies mainly the findings of the author, in his own Laboratory. Such as they are, they may be considered imperfect or may not agree with other research workers' labours. Another portion of the Appendix will serve as an indicator to

the use of Indian Drugs in different diseases, and it has been put up at the end of the book, for purposes of ready reference by the busy practitioners.

Botanical Descriptions of Drugs have been purposely omitted as one can always consult the monumental work, "Indian Medicinal Plants" by Drs. D. Basu & Major Kirtikar I.M.S., and the invaluable plates published with it.

The author is very thankful to Mahamahopadhyaya Kaviraj Gananath Sen, Saraswati, B. A., L. M. S., for several helpful suggestions as also to his neighbour, Dr. Rames Chandra Ray, L.M.S., the versatile writer, for his valuable and inspiring advice and for the friendly services of going through the major portion of the book in proof.

Dr. N. K. Bose, M.B. Pharmacologist, Dr. Bose's Laboratory Ltd. conducted the Physiological experiments Mr. N. K. Bose, M. Sc. Analyst did the chemical analysis of the drugs.

The book is not free from printing and other mistakes and the author hopes to rectify them in the next edition.

The author will consider his labours amply repaid, if the medical profession in India and the tropics, deem this little volume of service and a stimulus to research work on these lines. After going through the book medical men are requested kindly to send their opinion as well as suggestions for additions and improvement in subsequent editions.

